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A TEXT BOOK OF MECHANO-THERAPY

MASSAGE AND MEDICAL GYMNASTICS

BY

AXEL V. GRAFSTROM, B.Sc., M.D.

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A TEXT BOOK OF

MECHANO-THERAPY

(MASSAGE AND MEDICAL GYMNASTICS)

ESPECIALLY PREPARED FOR THE USE OF

MEDICAL STUDENTS AND TRAINED NURSES

BY

AXEL V. GRAFSTROM, B.Sc., M.D.

LATE LIEUTENANT IN THE ROYAL SWEDISH ARMY; LATE HOUSE PHYSICIAN, CITY HOSPITAL, BLACKWELL'S ISLAND, NEW YORK

WITH ELEVEN PEN-AND-INK SKETCHES

BY THE AUTHOR

NEW YORK CITY

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1898

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WITH ELEVEN FULL-PAGE [illegible]

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WITH

GREATEST AFFECTION

DEDICATED TO MY WIFE

WHO, BY HER ADVICE AND ENCOURAGEMENT,

HAS MATERIALLY AIDED THE AUTHOR

IN THE PREPARATION OF THIS

LITTLE VOLUME

65594

PREFACE.

In preparing this little volume it has been my endeavor to present the subject of Mechano-Therapy in a condensed form, and in a rational and popular way, in order to make it easily understood by the student.

The system practised by the Royal Gymnastic Central Institute, Stockholm, Sweden, has been principally followed, with such modifications as are recommended by prominent teachers and authorities of this science.

The works of Hartelius, Brandt, Graham, Taylor, and Posse have been freely consulted.

After a careful consideration it was decided to omit the subjects of uterine and ocular massage, as they belong more properly to the specialist.

I am greatly indebted to Dr. Edwin P. Wolfe, of the City Hospital, Blackwell's Island, New York, and to Francis F. Leman, Esq., for their careful revision of the manuscript.

I wish, also, to express my gratitude to Dr. Frank P. Foster, editor of *The New York Medical*

Journal, to Dr. George M. Gould, editor of *The Philadelphia Medical Journal*, to Drs. Egbert Guernsey and Alfred Kimball Hills, editors of *The New York Medical Times*, and to Mrs. Annette Sumner-Rose, editor of *The Trained Nurse*, for their kindness in permitting the use of my articles appearing in their respective magazines.

AXEL V. GRAFSTROM.

NEW YORK, July, 1898.

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MECHANO-THERAPY.

CHAPTER I.

INTRODUCTION, CLASSIFICATIONS, AND DEFINITIONS.

By **Mechano-therapy** we understand the mode of treating diseases by movements.

It is a science both in theory and in practice. Founded on purely scientific researches, discoveries, and facts, its path runs parallel to, and in close contact with, physiology, anatomy, and pathology.

We should carefully distinguish between mechano-therapy and educational gymnastics or physical education. The former is a purely remedial agent. It aids Nature in her battle against disease. The latter assists Nature in the development of a fine physique. Its mission is to create a healthy body as a dwelling for a healthy soul, rather than to restore to health a body diseased.

The movements may be either **active** or **passive.**

If the movement is executed by the patient's own will and power it is called **active.**

A **passive** movement is performed either with or upon some part of the patient's body by a will and power other than the patient's.

Active movements are either simple or complicated.

Simple active movements are those which the patient performs himself without any assistance or resistance whatever.

Complicated active movements are such movements as are executed by the combined efforts of the patient and the operator.

Further, the complicated active movements have been divided into :

1. **Active passive** (Rothstein) or *duplicated concentric movements* (Neuman) which are executed by the patient against the resistance of the operator ; and

2. **Passive active** (Rothstein) or *duplicated eccentric movements* (Neuman) which are executed by the operator against the resistance of the patient.

The difference between a *concentric* and an *eccentr* movement may be best illustrated by attempting to li a stone from the ground to a certain plane above, an then, to remove the same stone from that plane to ground. The muscle-power in the first attempt is eq to the weight of the stone plus the friction of the joi of the upper extremities. The muscle-power in second effort is equal to the weight of the stone mi the friction of the same joints (Hartelius).

Some authors distinguish between **assistive** an **sistive active movements.** Assistive moven are those executed by the patient with the assistan the operator. Resistive movements are those perfo by the patient against the resistance of the operat

Of the passive movements we have really two · ties, namely, the **centrifugal** and the **centripet**

In executing a centrifugal movement, the forc is directed from the center toward the periphery is, in the direction of the arterial circulation. I forming a centripetal movement, the force is di

from the periphery toward the center, or in the direction of the venous circulation.

These expressions have also been used in connection with active movements.

In mechano-therapy the use of simple active movements is very limited. They belong rather to educational gymnastics or physical education.

When giving a treatment by mechano-therapy the patient should be placed in a certain position called **gymnastic posture.** The principal postures are the *standing*, *sitting*, and *lying*. These positions may again be subdivided into more complicated ones.

In the study of mechano-therapy we find two distinctly separate classes; viz., **medical gymnastics** and **massage.** By medical gymnastics we understand that branch of mechano-therapy which deals with active and passive movements of the various joints of the body. These movements are flexion, extension, abduction, adduction, rotation, and circumduction. Massage is a series of passive movements executed on the patient's body in a variety of ways and constitutes the other branch of mechano-therapy. These passive movements are friction, kneading, percussion, stretching, pressure, vibration, and stroking. According to the method of manipulating with the different parts of the hand, it is designated *palmar*, *digital*, *ulnar*, or *dorsal massage*.

Mechano-therapy rests upon a foundation of certainty in theory, and requires precision in practice. To be an expert operator, a long and careful study of not only this science, but also of physiology, anatomy, and pathology is required, together with an accurate knowledge of diseases, and a thorough practical training in the different modes of manipulation.

Although a science in itself, we must always bear in

revived the interest in mechano-therapy in Eu
Weir Mitchell belongs, undoubtedly, the hono
troducing this science in America, to grasp i
were, from the hands of quackery and bring it un
control of the medical profession. In this great
taking he has been assisted by, and had as co-op
such good men as George H. Taylor, of New
Douglas Graham, of Boston, Nils Posse, of Bost
G. Norström, of New York.

CHAPTER II.

THE EFFECTS OF MOVEMENTS.

Movements, active and passive, affect the body in different ways. It is extremely difficult to draw sharply a line of distinction between the action of passive and active movements. They are, as it were, linked together. They work hand in hand. In their effect they are so similar, and yet so different.

"The effect of a movement is the result of its action, and the reaction of our organism."—(Roth.) The effect of a movement may be either general or local; therefore we are able to give both a constitutional and a local treatment. Active movements, by requiring the use of attention, will cultivate the power of co-ordination; passive movements have a tendency to favor inactivity of attention. "Active movements will decrease the adipose tissues and harden the muscular tissues. Passive movements will cause a greater amount of fat to accumulate between the muscles and beneath the skin."—(Posse.)

In this chapter we will consider the effects of movements in connection with:

1. The blood (circulation).
2. The different tissues.
3. The absorption.
4. The digestion.
5. The secretion and excretion.
6. The respiration.

7. The nervous system.
8. The organs of generation.

Blood.—All movements increase the circulation of the blood, either in the arteries, capillaries, or veins. An increased temperature, a pulse increased in strength, fulness, and sometimes in rapidity, and a healthier color of the skin will verify this statement. Any muscular contraction will effect a pressure on, or a compressure or contraction of the walls of the vessels situated either within or in the immediate neighborhood of that muscle. Now, we know that contraction of the blood-vessels means increased blood-pressure or flow of blood. Again, any movement which will alternately contract and relax a certain group of muscles, will likewise alternately retract and elongate the veins situated with in and in the vicinity of that group of muscles, ther by producing a suction, which hastens the blood-stre toward the heart. Further, certain medical gymnast of the different joints of the body produce an alterr contraction and dilatation of the blood-vessels in around those joints, thereby creating a stimulus ν will increase the flow of blood through the ve And, finally, movements of different parts of the bo increase the circulation of blood toward and withi parts, and at the same time decrease the flow of to the adjacent parts or organs. By these me are often able to increase or decrease the su blood to different parts of the body. As a rule, movements increase both the circulation an action, while passive movements increase the tion without affecting the action of the heart.

Different Tissues.—By increasing the flow to any part of the body an increased nutritic ried to that tissue, be it muscular, glandula

or bony tissue. By increasing the venous circulation, the waste matter, resulting from changes in the tissue, is collected and hurriedly transported to those organs by which it is finally excreted or discharged from the body. All movements are also mechanical stimulants to muscular and bony tissues. By their careful application muscular irritability and fatigue will be lessened, and the muscles, ligaments, nerves, and bones will grow stronger and more elastic.

Absorption.—It is well known that the object of absorption is to introduce new materials into the blood. It is carried on chiefly in the small intestines, skin, respiratory organs, and from some of the closed cavities of the body. The veins and the lymphatic vessels are the principal agents of absorption. Movements will stimulate absorption, and hasten endosmosis, diffusion, and filtration. The manufacture of blood is thereby increased and improved. "The unceasing wastes caused by muscular action, and the expenditure of the blood constantly taking place, must be made good with materials from the digestive surface. The connection between muscular action and absorption is direct."

Digestion.—All exercise tends to increase the appetite, and as movements are only a regulated and scientific form of exercise adapted to the invalid, they increase the demand for food, aid the digestion, be it the salivary, the gastric, or the intestinal digestion, and defecation. They stimulate the secretions necessary to the process of digestion, increase the peristalsis of the stomach, which hastens the mixing of the food with the gastric juice, and increase the flow of bile. Finally, the act of defecation can be greatly assisted by proper movements.

Secretion and Excretion.—The activity of all

secreting glands is stimulated by blood-pressure. Having already noted that movements increase blood-pressure, it will be easily understood that they will hasten the act of secretion. Regarding the excretions we will consider, first, the kidney, which is the principal organ of excretion in the body. The elimination of urine is accomplished by two different processes; namely, filtration and secretion. Directly, the filtration, which takes place in the Malpighian tufts, is increased by movements, while the secretion, going on in the convoluted tubules, is only indirectly affected by blood-pressure or by movements. The flow of urine from the kidney to the bladder is hastened by movements, which also strengthen the involuntary muscles of the bladder, the abdominal muscles, and the diaphragm, all of which take part in the act of micturition. The skin is an important excretory organ, and is in a measure supplementary to the kidney. By movements its pores are opened, and it is stimulated to perform its function better, which gives the overworked kidney an opportunity to rest.

Respiration.—A large and roomy thorax gives ample space for the lungs to perform their function; viz., inspiration and expiration. The act of inspiration is performed, principally, by the intercostal muscles and diaphragm, aided perhaps by the sterno-mastoid, pectoralis minor, serratus posticus superior and inferior, and the rhomboidei. The act of expiration is performed by the elastic tissue of the lungs, aided by the flat muscles of the abdomen, the rectus, and the internal intercostals. By respiratory movements these muscles are exercised, made stronger, and enabled to perform the act of respiration more perfectly. The circulation in the pulmonary vessels is increased, the lung-tissue developed,

more oxygen brought in contact with the hæmoglobin of the blood, and the elimination of carbon dioxide and other waste products from the body is accelerated.

Nervous System.—We have already explained that movements, by increasing the circulation of blood, bring additional nutrition to the nerve-tissue. We also know that mechanical stimuli will generate nerve-force. Take the human body in a healthy condition; exercise is necessary to keep it so. If the body does not get a sufficient amount of exercise the nerves will soon begin to suffer from degeneration, atrophy, irritability, or abnormal sensibility. Now, mechano-therapy is only exercise scientifically adapted to a diseased body, and in order to restore the diseased nerves to health movements are more or less called for. "If movements (exercise) will be prescribed so as to adapt nicely the quality and quantity to the condition of the invalid, the encouragement thus afforded to the failing forces imparts new energy to the whole man, and we often see him in a few days brought up out of his slough of despond and enjoying the sunshine of hope and renovated feeling."

Organs of Generation.—An absolutely physical rest will produce degeneration of the body, and of the generative organs, as a part of the body. A man and woman, accustomed to taking daily exercise and suffering from no disease, are in the best physical condition to produce healthy offspring. But exercise is one of the factors needed to keep them in this condition, and to keep their respective generative organs healthy. If now, from any cause they should suffer from disease, mechano-therapy will supply the necessary exercise, aid Nature in her warfare against disease, and assist her to restore the general health, and, consequently, to restore the generative organs to their normal condition.

CHAPTER III.

GYMNASTIC POSTURES.

By gymnastic posture is understood the manner in which the patient carries, places, or rests his body while undergoing treatment by mechano-therapy.

The principal gymnastic postures are the **Standing, Sitting,** and **Lying,** each of which can be subdivided into more complicated ones.

The operator should be careful to place his patient in the correct posture when executing any movement, be it passive or active, for by permitting the patient to occupy a faulty position the benefit of the movement will be lost, the treatment will be a failure, and often the effect will be harmful.

A. **The Standing Posture.**—The patient should stand erect with the heels close together, the toes separated a distance equal to the length of one of his feet, the weight of the body being borne equally upon each foot. The head should be held well up and in the median line. The shoulders in the same horizontal plane and drawn well back to expand the chest, the arms should hang easily by the sides with the hands partly closed and the palms turned toward the body.

Subdivisions.

1. *On Toes Standing Posture.*—Having placed the patient in the standing posture, instruct him to raise his heels about two or three inches from the

keeping them together and the toes separated as in the standing posture. The weight of the body should be equally divided on the ball of each foot. Regarding the rest of the body observe the rules of the standing posture.

2. *Standing Posture with Separated Feet.*—This posture differs from the standing posture only in that the heels are separated about two feet instead of being together.

3. *Standing Posture with Support.*—The patient, placed in the standing posture, flexes the shoulder-joints and extends the elbow-joints, and rests the palms of his hands against a door, wall, or similar object, at the same time leaning the body forward so as to make an acute angle with the floor in front of him. Otherwise observe the rules of the standing posture.

In the standing posture and its subdivisions the arms, instead of being held by the sides, may be held in such manner that each hand shall rest upon the corresponding hip with the thumb posterior, and the rest of the hand anterior.

B. **The Sitting Posture.**—In this position the posterior surface of the thighs rests on a horizontal plane, the legs are flexed to a right angle, the heels together, and the toes separated as in the standing posture. The trunk is held vertically, the upper extremities either held close to the sides with the hands resting on the object upon which the patient is seated, or extended at an angle with the hands grasping the hips, the thumbs posterior and the fingers anterior. Regarding the head and shoulders observe the rules for the standing posture. The back should not be supported, except by the operator when giving a movement.

Subdivisions.

1. *Half-sitting Posture.*—The patient's lower extremities rest on, and are in close contact with, a horizontal plane. The trunk, or the upper part of the body, is in a vertical plane. The back is not supported. Otherwise observe the rules for the sitting posture.

2. *Ride Sitting or Astride Sitting Posture.*—Let the patient sit astride a chair, stool, or sofa, with his feet resting on the floor. The arms should be held close to the body with the hands resting on the seat, or extended from the body, and the hands grasping the hips. Otherwise observe the rules for the sitting posture.

C. **The Lying Posture.**—The patient rests on a horizontal plane with no part of his body elevated. For practical purposes and in order to give more comfort to the patient, the head may be supported by a pillow. The patient may either be on his back or on his chest and abdomen. Otherwise observe the rules for the standing posture.

Subdivisions.

1. *Reclining or Half-lying Posture.*—In this posture the patient rests with the lower extremities on a horizontal surface, while the trunk is supported on an inclined plane, elevated to an angle of about 45°. Otherwise observe the rules of the lying posture.

2. *Dorsal Posture.*—The patient lies on his back on a flat surface with the thighs flexed and somewhat abducted, the legs flexed on the thighs; the feet supported by the plane on which the patient lies. The knees should be far enough apart to allow ample space for the operator to work without causing the patient

any discomfort. The head and shoulders are somewhat elevated and supported.

3. *Knee-Chest Posture.*—The patient is placed on a bed, table, or other flat surface in such a manner that with the thighs flexed to a right angle and legs flexed on the thighs the body weight shall be borne upon the knees and chest. The head, which rests upon a pillow, should be turned to one side and the arms extended and folded above the head.

4. *Sims's Posture.*—The patient lies on the left side on some horizontal surface, preferably a table, the left arm held behind the back, the head resting upon a pillow, right arm thrown forward and resting on the pillow; the knees well drawn up, with the right being considerably in advance of the left.

5. *Trendelenburg's Posture.*—The patient lies upon his back on a suitable table, with the legs hanging over one end of the table. The foot-end of the table is now raised, thus elevating the pelvis and thighs, and allowing the abdominal viscera to recede from the pelvis. The patient's body should be supported either by suitable rests against the top of the shoulders, or by passing a stout bandage around the patient's legs, and the legs at the foot end of the table, to prevent the body slipping off when that end of the table is elevated.

CHAPTER IV.

MEDICAL GYMNASTICS.

Medical gymnastics consist of a series of passive and active movements of the different joints of the body, executed for the purpose of restoring a diseased body to health.

These movements are flexion, extension, abduction, adduction, rotation, and circumduction.

The following joints only are of interest in connection with mechano-therapy; viz., neck-joint, shoulder-joints, elbow-joints, wrist-joints, finger-joints, hip-joints, knee-joints, ankle-joints, toe-joints, and trunk-joint.

Whenever a joint is capable of motion in all directions, that is, able to perform flexion, extension, abduction, adduction, and rotation, the circumduction of that joint will be a true or complete one. If the movements of the joints are limited to certain directions, the circumduction will be a false or an incomplete one.

THE NECK-JOINT.

We have really four different articulations belonging to this joint, namely:

1. Articulation of the atlas with the axis.
2. Articulation of the atlas with the occipital bone.
3. Articulation of the axis with the occipital bone; and
4. Articulation of the axis with the third cervical vertebra.

But for practical purposes it has been judged best to consider all these articulations as forming one principal joint; viz., the neck-joint.

Movements: flexion, extension, abduction, adduction, rotation, and circumduction.

The circumduction of the neck-joint is a true or complete one.

A. **Flexion and Extension with Resistance** will be considered as one movement.

1. In performing this movement, which is an active one, the patient should be placed in the standing posture with support. The operator occupies a position behind the patient and somewhat to one side, with his left hand on the patient's left shoulder, and his right hand (palmar surface) over the patient's occiput.

2. The patient first flexes his head under slight assistance from the operator. During extension and hyper-extension the operator resists the patient's attempt.

3. This movement should be performed slowly, and it can be repeated from six to twelve times.

Flexion and extension with resistance act on the flexor and extensor muscles of the head, on the different ligaments belonging to the neck-joint, on the upper part of the spinal cord, and on the circulation of the blood to and from the head.

B. **Abduction and Adduction with Resistance** will be considered as one movement.

1. The patient is placed either in the sitting or in the astride-sitting posture. The operator stands behind the patient with the palmar surface of his hands (finger-tips anterior) over the temporal bones of the patient's head.

2. The patient performs the movement. During ab-

duction he is assisted by the operator, but during adduction the operator resists the attempt.

3. It is an active movement and should be executed slowly.

4. It can be repeated from six to twelve times.

This movement acts principally on the abductor and adductor muscles of the head. It also acts on the different ligaments of the neck-joint, on the upper part of the spinal cord, and, to a slight degree, on the circulation.

C. **Rotation with Resistance.**

1. The patient occupies either the sitting or the astride-sitting posture. The operator, standing behind the patient, places his hands (the palmar surface with finger-tips anterior) over the temporal bones of the patient's head.

2. The patient rotates his head to one side with the assistance of the operator. During forward rotation the operator resists the movement.

3. This is an active movement and should be performed slowly.

4. It may be repeated from six to twelve times.

It acts chiefly on the rotator muscles of the head and on the different ligaments of the neck-joint.

D. **Circumduction** (true or complete).

1. The patient is placed in either the sitting or the astride-sitting posture. The operator stands behind him. With his left hand he grasps the patient's frontal bone, and with his right, the patient's occiput.

2. This is a passive movement and should be executed slowly by the operator.

3. It can be repeated from six to twelve times.

Circumduction of the head acts mostly on the circulation in this part of the body. It relieves congest

FIG. 1.—FLEXION AND EXTENSION OF THE ARMS AGAINST RESISTANCE.

(FLEXION.)

FIG. 2.—FLEXION AND EXTENSION OF THE ARMS AGAINST RESISTANCE.

(EXTENSION.)

of the brain, and of the eyes, nose, ears, and throat. To a slight degree it acts on the upper part of the spinal cord, on the cranial nerves, and on the ligaments of this joint.

UPPER EXTREMITIES.

The Shoulder-joint.—The bones entering into the formation of this joint are the head of the humerus, received into the glenoid cavity of the scapula.

Movements: flexion, extension, abduction, adduction, rotation, and circumduction.

The circumduction of the shoulder-joint is a true or complete one.

A. **Flexion and Extension with Resistance** will be considered as one movement. (Fig. 1 and Fig. 2.)

By flexion is understood that movement wherein the humerus is drawn forward by the pectoralis major, the anterior fibres of the deltoid, coraco-brachialis, and by the biceps when the elbow is fixed. By extension is understood that movement wherein the humerus is drawn backward by the latissimus dorsi, teres major, the posterior fibres of the deltoid, and by the triceps when the elbow is fixed.

1. The patient occupies either the sitting or the astride-sitting posture, with the arms flexed and the forearms extended. The arms are held parallel to each other, and in the same horizontal plane as the shoulders, the palmar surface of the hands looking toward each other. The operator stands in front of the patient and grasps either his hands or his wrists.

2. Against the resistance of the operator the patient extends the arms and flexes the forearms simultaneously.

3. Against the resistance of the operator the patient flexes his arms and extends his forearms.

4. Between No. 2 and No. 3 some hyper-extension should be done.

5. This is an active movement, and it can be repeated from six to eight times.

This movement acts on the respiration and circulation, on the flexor and extensor muscles of the shoulder-joint, and on the ligaments of that joint.

B. **Abduction and Adduction with Resistance** will be considered as one movement.

1. Place the patient either in the sitting or the astride-sitting posture with arms abducted and the forearms extended. Let the arms be parallel, and the dorsal surface of the hands directed toward each other. The operator occupies a somewhat elevated position behind the patient and takes hold of the patient's hands—palmar surface against palmar surface.

2. The patient slowly adducts both arms and flexes the forearms against the resistance of the operator.

3. The patient slowly abducts his arms and extends his forearms, the operator resisting the movement.

4. Between No. 2 and No. 3 there should be some hyper-abduction.

5. During this movement the operator should support the patient's back with one leg.

6. It is an active movement and should be repeated from six to twelve times.

This movement acts on the respiration and circulation, on the abductor and adductor muscles of the shoulder-joint, and on the ligaments of that joint.

C. **Rotation with Resistance.**

Rotation can be performed inward and outward.

1. The patient occupies either the sitting or the reclining posture. Both arms are flexed and the fore-

arms extended. The operator, standing in front of the patient, grasps the patient's hands or wrists.

2. The operator rotates the humerus inward and pronates the radius (both arms) against some resistance of the patient.

3. The operator rotates the humerus outward and supinates the radius (both arms) the patient resisting.

4. Or the patient can perform the movement against the resistance of the operator.

5. This is an active movement and can be repeated from four to eight times. It must be executed carefully and slowly.

It acts chiefly on the rotator muscles, and the different ligaments of the shoulder-joint. Its use is very limited.

D. **Circumduction** (true or complete).—There are two forms of circumduction of this joint; namely, circumduction with the arms abducted, and circumduction with the arms extended. The latter movement is, undoubtedly, the stronger of the two.

Subdivisions.

1. *Circumduction with Arms Abducted.*—The patient is placed in either the sitting or the astride-sitting posture, with the arms abducted and parallel, the forearms extended, and the dorsum of the hands directed toward each other. The operator occupies a somewhat elevated position behind the patient, and grasp the patient's hands, palm to palm.

2. The operator slowly performs a circumduction, that is, moving the patient's arms in a circle, going forward, outward, backward, and inward.

3. During this movement he supports the patient's back with his leg, and, when the arms are carried well

back, presses the patient's chest forward with that leg.

4. This is a passive movement, and can be repeated from six to twelve times.

This movement acts principally on the respiration and circulation, increasing the pulmonary circulation, and the flow of blood from the arms.

1. *Circumduction with Arms Extended.*—Let the patient occupy either the sitting or the astride-sitting posture, with the arms and forearms extended, and in the same horizontal plane as the shoulders, and with the palmar surface of the hands downward. The operator, standing behind the patient, supports the patient's arms a little above the elbows on the dorsal surface of his hands.

2. The patient's arms are made to describe a circle going forward, upward, backward, and downward. During this movement he supports the patient's back with either his chest or abdomen, and when the patient's arms are drawn well backward, he presses the patient's chest forward.

3. It is a passive movement and can be repeated from six to twelve times.

Its action, like that of the previous one, is chiefly on respiration and circulation.

The Elbow-joint.—The bones entering into the formation of this joint are the humerus, the ulna, and the radius.

It may be correctly said that this joint is divided into three different portions; viz.,

1. The joint between the ulna and humerus.
2. The one between the radius and humerus; and
3. The portion between the radius and ulna.

Movements: flexion, extension, and rotation.

Flexion and extension belong to the articulation between ulna and humerus; rotation to the radio-ulnar portion of the joint.

The radio-ulnar articulation, which is divided into three parts; viz., the superior, middle, and inferior, permits rotation; that is, pronation and supination. For practical purposes and in order to simplify the matter, this movement will be considered as belonging to the radio-ulnar articulation of the elbow-joint.

The different movements of this joint are usually performed in connection with those of the shoulder-joint, and have already been described. In the treatment of local injuries and local expressions of different diseases, simple movements of the elbow-joint are used, and in such cases the patient is placed in the sitting, lying, or reclining posture.

A. **Flexion and Extension with Resistance** will be considered as one movement.

1. The elbow is supported and the humerus fixed.

2. An active movement, to be repeated from six to twelve times.

Its action is principally on the flexor and extensor muscles, and the ligaments of the joints.

B. **Pronation and Supination with Resistance** will be considered as one movement.

1. The humerus is fixed.

2. An active movement, to be repeated carefully and slowly from four to eight times.

It acts chiefly on the rotator muscles, and on the different ligaments connecting the ulna and radius. The use of this movement is very limited.

The Wrist-Joint.—The bones entering into the formation of this joint are the radius, scaphoid, semilunar, and cuneiform.

Movements: flexion, extension, abduction, adduction, and circumduction.

The circumduction is only a false or an incomplete one.

The movements of this joint are generally used in the treatment of some local injury or disease, and the patient is placed in either the reclining or the lying posture.

Together with the movements of the previous joints they are also used in the general massage treatment.

A. **Flexion and Extension with Resistance** will be considered as one movement.

1. Ulna and radius to be fixed.

2. An active movement, to be repeated from six te twelve times.

It acts on the flexor and extensor muscles, and the different ligaments of the joint.

B. **Abduction and Adduction** will be considered as one movement.

1. Fix ulna and radius.

2. It can be either an active or a passive movement, and is used in the treatment of local diseases and injuries.

3. It can be repeated from six to eight times.

This movement acts principally on the abductor and adductor muscles, and on the different ligaments of the wrist-joint.

C. **Circumduction** (false or incomplete).

1. Let ulna and radius be fixed.

2. A passive movement, which can be repeated from six to twelve times.

It acts on the circulation, on the vessels and nerves.

The Finger-Joints.—We have three different sets of articulations belonging to these joints ; viz.,

1. Carpo-metacarpal articulations.

2. Metacarpo-phalangeal articulations ; and

3. Articulations of the phalanges.

In connection with mechano-therapy each finger and the thumb are considered as forming only one joint, and each of these joints will allow the following **Movements ;** viz., flexion, extension, abduction, adduction, and circumduction.

This circumduction is a false or an incomplete one.

The movements may be either passive or active ; generally the passive ones are used.

These movements are of great service in the treatment of local injuries and local manifestations of different diseases. The following rules should be observed :

1. The position of the patient is immaterial.

2. Each movement to be repeated from six to twelve times.

The flexion and extension, the abduction and adduction act on the different muscles and ligaments ; the circumduction on the vessels and nerves.

LOWER EXTREMITIES.

The Hip-Joint.—The bones entering into formation of this joint are the femur and the acetabulum of the os innominatum.

Movements : flexion, extension, abduction, adduction, rotation, and circumduction.

This circumduction is a true or complete one.

A. **Flexion and Extension with Resistance** will be considered as one movement.

1. The patient is placed in either the lying or the reclining posture, and the operator stands in front and

to one side of the patient. With one hand he supports the patient's knee from beneath, and with the other he grasps the plantar surface of the patient's foot.

2. The patient flexes the thigh and leg with the assistance of the operator.

3. The patient extends the thigh and leg against the resistance of the operator.

4. It is an active movement, to be repeated from six to twelve times.

This movement acts on the ligaments, and flexor and extensor muscles of the joint, and on the muscles of the lower part of the abdomen. It relieves congestion of the uterus and its appendages, of the bladder, rectum, and prostate.

B. **Abduction and Adduction with Resistance** will be considered as one movement.

1. The patient is placed in the dorsal posture with his heels together. The operator, standing in front of the patient, supports, with the palmar surface of his hands, the external surface of the patient's knee.

2. Both legs are simultaneously abducted against the resistance of the operator. (Fig. 3.)

3. Now, the patient adducts his legs, and the operator, having removed his hands to the internal surface of the knees, resists the movement. (Fig. 4.)

4. This is an active movement and can be repeated from six to twelve times.

It acts on the abductor and adductor muscles, and on the ligaments of the joint. It is used in chronic constipation, and in congestion of the uterus and its appendages, of the bladder, rectum, and prostate.

C. **Rotation with Resistance.**—The femur can be rotated inward and outward.

1. Place the patient in the reclining posture. The

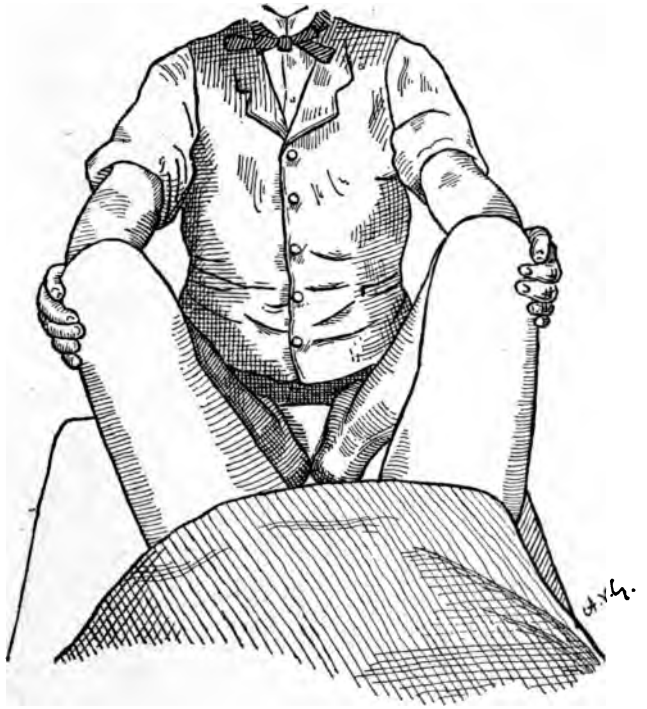

FIG. 3.—ABDUCTION AND ADDUCTION OF THE THIGHS AGAINST RESISTANCE.

(ABDUCTION.)

FIG. 4.—ABDUCTION AND ADDUCTION OF THE THIGHS AGAINST RESISTANCE.

(ADDUCTION.)

operator, standing in front and somewhat to one side of the patient, grasps the patient's knee with one hand, and with the other hand the ankle-joint.

2. Keeping the knees extended the patient performs the rotation against the resistance of the operator.

3. Or the operator can rotate the limb against the resistance of the patient.

4. It is an active movement, and can be repeated from six to twelve times. It should be executed carefully and slowly.

This movement acts principally on the rotator muscles of the hip, and on the different ligaments of that joint. Its use is limited.

D. **Circumduction** (true or complete).

1. Let the patient occupy either the lying or the reclining posture. The operator, standing in front and a little to one side of the patient, grasps the patient's foot with one hand, and the patient's knee with the other.

2. The patient flexes his knee, and the operator performs the circumduction from within outward, or from without inward, but the extremity should never be carried across the median line.

3. It is a passive movement, and can be repeated from six to twelve times.

This movement is used in stiffness of the hip-joint, and also to relieve congestion of the organs in the pelvic cavity. It accelerates the flow of blood in the iliac veins.

The Knee-Joint.—The following bones enter into the formation of this joint; viz., the femur, tibia, and patella.

Movements: flexion, extension, and rotation.

The rotation of the knee-joint is very limited.

A. **Flexion and Extension with Resistance** will be considered as one movement. This movement has already been described in connection with the hip-joint. In performing the movement with only the knee-joint, the following rules should be observed:

1. The patient occupies the reclining posture, and the operator, sitting in front and somewhat to one side of the patient, places one of the patient's legs (the nearest one) across his knee in such manner that the patient can freely perform flexion and extension. With one hand he fixes the patient's femur, and with the other he grasps the ankle-joint.

2. The patient flexes and extends the leg against the resistance of the operator.

3. This is an active movement, and can be repeated from six to twelve times.

It acts on the flexor and extensor muscles, and on the ligaments of the knee-joint.

B. **Rotation.**—This movement may be either active or passive, and is used only in the treatment of local injuries or local manifestations of disease. The operator and the patient occupy postures similar to those in the preceding movement. Its action is principally upon the rotator muscles and ligaments of the joint.

The Ankle-joint.—The bones entering into the formation of this joint are the tibia, fibula, and astragalus.

Movements: flexion, extension, abduction, adduction, and circumduction.

The circumduction is only a false or incomplete one.

A. **Flexion and Extension with Resistance** will be considered as one movement.

1. The patient is usually placed in the reclining posture, and the operator, sitting in front of the patient,

with the patient's foot on his knee, fixes, with one hand, the fibula and tibia, and with the other he exerts the resistance.

2. The patient flexes his foot, and the operator resists with his hand on the dorsal surface of the foot the patient's attempt.

3. The patient extends the foot and the operator resists with his hand on the plantar surface.

4. It is an active movement, and can be repeated from six to twelve times.

It acts on the flexor and extensor muscles and on the different ligaments of the joint.

B. **Abduction and Adduction** will be considered as one movement.

This movement is performed with the patient and the operator occupying the same positions as in the preceding movement. It can be repeated from six to twelve times, and may be either an active or a passive movement. It is used generally in the treatment of local injuries or local manifestations of different diseases.

C. **Circumduction** (false or incomplete).

1. The patient generally occupies the reclining posture, and the operator sits in front with the patient's foot resting on his knee. With one hand he fixes the tibia and fibula, and with the other he grasps the patient's foot.

2. The circumduction is performed by the operator. It is a passive movement, and can be repeated from six to twelve times.

It acts by increasing the circulation in the lower extremities, and is used to correct stiffness of this joint.

The Toe-joints.—For practical purposes each toe will be considered as forming only one joint. Still it

must be borne in mind that there are three different sets of articulations :

1. The tarso-metatarsal articulations.
2. The metatarso-phalangeal articulations ; and
3. The articulations of the phalanges.

Movements : flexion, extension, abduction, adduction, and circumduction.

The circumduction is a false or an incomplete one.

A. **Flexion and Extension** will be considered as one movement.

1. The patient is placed in either the reclining or the lying posture, while the operator, either standing or sitting in front of the patient, fixes, with one hand, the patient's foot, and, with the thumb and index-finger of the other hand, grasps the toe to be moved and executes the movement.

2. This is a passive movement, to be repeated four to eight times.

It acts on the flexor and extensor muscles of the toes, and on the ligaments.

B. **Abduction and Adduction.**

The patient and the operator occupy positions similar to those in the preceding movement. This is a passive movement, and acts on the abductor and adductor muscles of the toes and on the ligaments.

C. **Circumduction** (false or incomplete).

The positions are similar to those above. It is a passive movement, and increases the circulation of the blood in the phalanges. It also relieves stiffness of the joints.

The Joint of the Vertebral Column or of the Trunk.—The articulations of the bodies of the vertebræ and those between the articular processes form a series of joints, which in connection with mechano-therapy will be considered as being one joint only.

Movements: flexion, extension, abduction, adduction, rotation, and circumduction.

The circumduction is a true or complete one.

A. **Flexion and Extension with Resistance** will be considered as one movement.

1. The patient is placed in either the sitting or the astride-sitting posture, and the operator stands behind the patient with his hands on the patient's shoulders.

2. The patient performs the flexion with the assistance of the operator.

3. While going from flexion to extension and hyper-extension, the operator resists the patient's attempt, and finally receives him on his chest and abdomen.

4. While going from hyper-extension to extension the operator only slightly resists the movement.

5. This is an active movement, and should be executed carefully and slowly. It can be repeated from six to twelve times.

It acts on the flexor and extensor muscles of the spinal column, and on the ligaments. It is also a respiratory movement, and has a strengthening effect upon the abdominal muscles, on the different organs in the abdominal cavity, and on the peritoneum.

B. **Abduction and Adduction with Resistance** will be considered as one movement.

1. Let the patient and operator occupy similar positions to those in the preceding movement.

2. The patient performs the abduction assisted by the operator.

3. During the adduction the operator resists the patient's effort.

4. This is an active movement, and can be repeated from six to twelve times.

It acts on the muscles and ligaments of the spinal

column. It also has a strengthening action upon the abdominal muscles, on the intestines and peritoneum, and on the other organs in the abdominal cavity.

C. **Rotation with Resistance.**

1. The patient and operator occupy the same positions as above.

2. The patient performs the rotation toward one side assisted by the operator.

3. During the forward rotation the operator resists the patient's effort.

4. This is an active movement, and can be repeated from six to twelve times.

It acts on the rotator muscles and ligaments of the spinal column. Otherwise, its action is similar to the previous movement.

D. **Circumduction** (true or complete).

1. The positions are the same as above.

2. The operator performs the circumduction slowly and carefully, describing circles with the patient's trunk.

3. It is a passive movement, and can be repeated from six to twelve times.

Circumduction acts principally on the vessels and nerves of the trunk. To a certain degree it has a strengthening effect on the organs in the abdominal cavity, and on the muscular fibres of the intestines. It hastens the return current of blood from the organs in the abdominal cavity. By this movement the circulation in the vertebral veins is also increased.

RESPIRATORY MOVEMENTS.

The ribs are capable of performing the following *movements;* viz., elevation, depression, slight rotation, upward and downward.

There are seven respiratory movements ; namely,

1. Passive chest-lifting, or passive elevation and depression of thorax.

2. Active chest-lifting, or active elevation and depression of thorax.

3. Active expansion of thorax with extended arms.

4. Circumduction of the arms, either in abduction or extension.

5. Abduction and Adduction of the arms with resistance.

6. Flexion and extension of the arms with resistance.

7. Flexion and extension of the spinal column with resistance.

1. Passive Chest-Lifting or Passive Elevation and Depression of Thorax.

1. The patient is placed in either the sitting or the astride-sitting posture. The operator, standing behind the patient, places the palmar surface of his hands over the patient's hips, and with a slight pressure performs a stroking upward in the axillary lines. Upon reaching the axillary spaces, he turns the dorsal surface of his hands upward (finger-tips anterior), and lifts the patient's shoulder upward and backward.

2. When the shoulders are drawn well backward, he presses the patient's chest forward with his own chest or abdomen.

3. This is a passive movement and can be repeated from three to six times.

2. Active Chest-Lifting or Active Elevation and Depression of Thorax.

1. Place the patient in the standing posture. Instruct him to carry his arms from their position along the sides of his body, slowly forward and upward, keeping them parallel, and the palmar surface of the hands

directed toward each other. This movement is continued until the arms are in complete abduction. While performing this movement the patient takes a long inspiration.

2. Now, let the patient turn his hands in such direction that their dorsal surface will be toward each other, and instruct him to carry them slowly from abduction to extension, hyper-extension, and finally to adduction. During this movement he should take a long expiration.

3. This is an active movement and can be repeated from three to six times.

3. Active Expansion of Thorax with Extended Arms.

1. Let the patient occupy the standing posture, and instruct him to extend his arms and flex his forearms. The hands should be pronated, and the arms in the same horizontal plane as the shoulders. During this movement the patient should take a long inspiration.

2. Now, instruct the patient to forcibly extend his forearms and hyper-extend the arms, still keeping them in the same horizontal plane. During this movement the patient should take a long expiration.

3. This is an active movement and can be repeated from three to six times.

Regarding respiratory movements in 4, 5, 6, and 7, see above under the different movements of the joints.

It must be understood that the choice of postures while giving medical gymnastics depends greatly upon the condition of the patient and the nature of the disease. Above, we have described the purest and simplest combinations as being, in our opinion, of the greatest service in the sick room; in this country the tendency seems to be for the patient to take the treat-

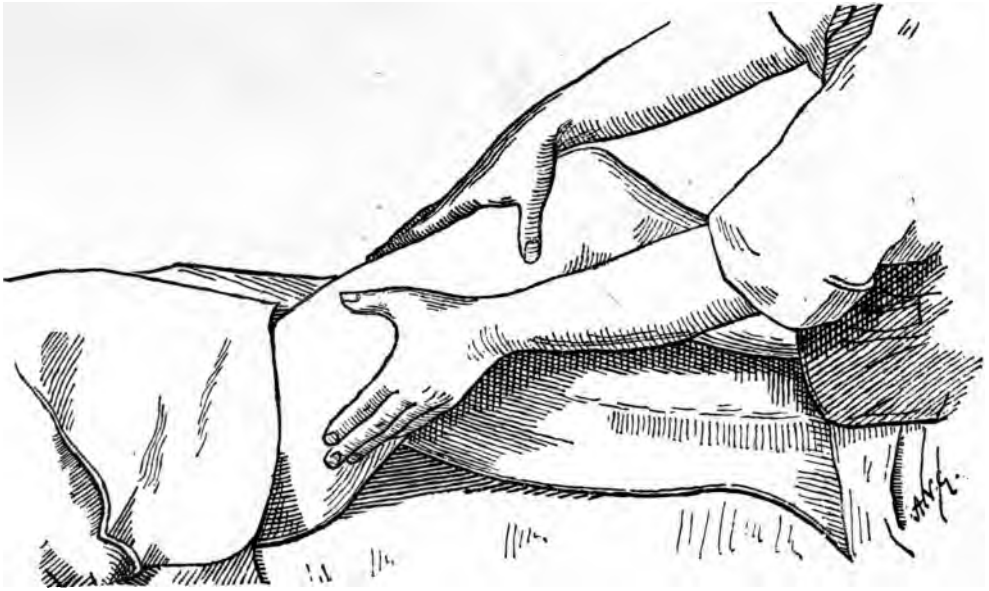

FIG. 5.—PALMAR FRICTION.

ment in his own home. Movements given by machines can never, in accuracy and exactness, be compared with those given by trained and skilful hands. In giving a scientific treatment of mechano-therapy the operator must use his brain and his eyes, as well as his hands. He must work with eyes, as it were, at his fingers' ends. Regarding this subject, the following sentence may properly be quoted: "Moreover, the habit of examining the living body with 'anatomical eyes' and 'surgical fingers' teaches the eye and the hand to act together, and trains that delicate sense of touch which every operator (surgeon) should possess."

CHAPTER V.

MASSAGE.

By **Massage** we understand a series of passive movements on the patient's body, performed by the operator for the purpose of aiding nature to restored health. These passive movements are friction, kneading, percussion, stretching, pressure, vibration, and stroking.

According to the mode of executing the different manipulations in regard to the part of the operator's hand used, they are designated palmar, digital, ulnar, and dorsal.

A. **Friction.**—According to its mode of execution, there are two varieties of this branch of massage; viz., **palmar** and **digital friction.** All friction should be done directly on the patient's skin, without the intervention of any coverings, and should invariably begin at the periphery and go toward the center; that is, in the same direction as the venous circulation. The action of this manipulation is principally to increase and improve the capillary circulation, to stimulate the peripheral nerves, to aid absorption, and to open the pores of the skin, thereby putting it in a better condition to perform its function. It is generally the first procedure in the series of passive movements, which constitute massage, and may be considered as the *advance guard.*. Friction plays a very important rôle when absorption of drugs through the skin is desired.

1. **Palmar Friction** (Fig. 5) is done with the palmar

FIG. 6.—DIGITAL KNEADING.

ab.

1.

surface of the hands, the fingers being in contact with each other, and the thumbs somewhat separated from the index-fingers. The hands, alternately describing about one-quarter of a circle, slide with a to and fro movement under some pressure over the skin. This procedure is used when the treatment is applied to a large portion of the body, as the trunk or extremities. The upstroke is heavy, the downstroke light.

2. **Digital Friction** is executed by the tips of the fingers in the same way as above. This variety is employed upon only small portions of the body, as the head, breasts, hands, or feet. In treating a finger or toe one thumb only is used at a time, and the index-finger of the same hand is used as a support.

B. **Kneading** usually follows friction. It consists of manipulations of either a single muscle or a group of muscles; also of similar movements upon the intestines, certain glands, and nerves. It is applied differently to different parts of the body. When several muscles are treated simultaneously the palmar surfaces of both hands are employed (*palmar kneading*), and in treating a single muscle or the intestines the fingers and thumb of each hand are used, while in the treatment of glands and nerves the finger-tips only are used (*digital kneading*).

1. **Palmar Kneading of the Extremities.**—The operator grasps the extremity to be treated between the palmar surface of his hands, and, moving them at the same time in opposite directions, lets them slide slowly and with a firm and steady pressure from the distal toward the proximal end of the extremity.

2. **Digital Kneading of a Single Muscle or Group of Muscles** (Fig. 6).—The operator picks up the muscle or muscles between his somewhat bent fin-

gers and thumbs, and rolling it over his thumbs, slowly moves his hands alternately along the muscle from its place of insertion to its place of origin. Digital kneading of the intestines is performed through the abdominal wall in a similar manner as above, going usually in the direction from the stomach toward the rectum. During intestinal kneading, the patient should occupy that posture which will most relax the abdominal muscles.

3. **In the Digital Kneading of Certain Glands;** *e.g.*, the mammary glands, the manipulation is performed with the finger-tips of one hand, going from the base of the breast to the nipple, while the palmar surface of the other hand supports the breast. The kneading of the liver is a digital one, and only one hand is used. The kneading of the uterus during labor is a combination of the palmar and digital form of kneading. It is executed with one hand only, and is confined to the fundus. The kneading of a nerve; *e.g.*, the sciatic nerve, is done by the finger-tips going from the center toward the periphery. *Deep kneading* of the large intestines can also be done with the finger-tips of one hand, working downward while gradually moving along the colon in direction from rectum to stomach (Fig. 7).

Kneading is recommended in weakness, atrophy, and inflammation of muscles. It is of great value in swellings of different joints, in sprains, and in neuralgia. In constipation, congested liver, dyspepsia, and colic it often gives relief. It is useful in certain glandular diseases. The greatest benefit of this variety of massage will, undoubtedly, be obtained by applying it directly to the uncovered body of the patient. Its action is that of an irritant, stimulant, and tonic to the muscles, both voluntary and involuntary. It promotes the passage of

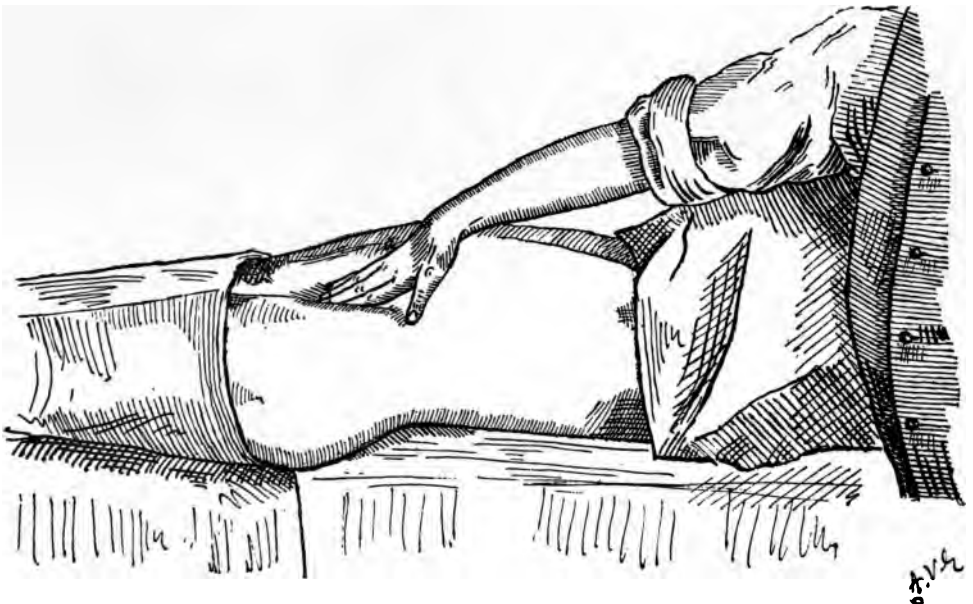

FIG. 7.—DEEP DIGITAL KNEADING OF THE DESCENDING COLON.

the white blood-corpuscles through the walls of the blood-vessels, and assists the transudation of lymph to irrigate and nourish the surrounding tissues. It hastens the absorption of the products of inflammation. On the intestines it acts by increasing their peristaltic power. It diminishes sensory irritability.

C. **Percussion** is the third variety of massage, and has been divided into *palmar*, *ulnar*, *digital*, and *dorsal percussion.*

1. **Palmar Percussion** is performed in such a manner that the operator strikes, in rhythmical measure, the body of the patient smart blows with the palmar surface of his hands, keeping the wrists flexible and going from center to periphery, that is, in opposite direction to the venous circulation. The hands may strike the body either simultaneously or alternately. Palmar percussion is used mostly on the extremities and trunk. On the extremities it is used for rheumatism, for motor and sensory paralysis, and for poor circulation, as cold feet and hands. On the chest it is recommended for pulmonary emphysema, pulmonary tuberculosis, bronchial asthma, and chronic bronchitis. On the back, it is often useful in the treatment of intercostal rheumatism and neuralgia, lumbago, neurasthenia, and insomnia.

2. **Ulnar Percussion** (Fig. 8) is executed in the following manner: the operator's hands, held parallel, the palmar surfaces directed toward each other, and the wrists flexible, alternately and in rapid succession, strike swift, light, and rhythmical blows upon the patient's body, the striking surface being the ulnar side of the hand and the little finger. It is used mostly on the back and on the cardiac region of the chest. When used on the back ulnar percussion proceeds from above downward with increasing force, the hands being paral-

lel with the spinal column, never crossing it. This kind of percussion is recommended in several cerebral and nervous diseases, and acts by stimulating and strengthening the spinal cord and nerves. When performing ulnar percussion on the cardiac region of the chest the greatest care should be observed. The percussion should describe small circles from right to left. Such a percussion can be used with advantage in cardiac dilatation, palpitation, pseudo angina pectoris, irregular action of the heart, fatty heart, and in mitral and aortic valvular lesions.

3. **By Digital Percussion** is understood the mode of performing percussion with the tips of the fingers. This manipulation can be performed with both hands, either simultaneously or alternately. It is used only on certain parts of the body, as the face, head, or over the liver and spleen.

4. **Dorsal Percussion** (Fig. 9) is done with the hand partly closed, the dorsal surface of the closed fingers striking the patient's body steadily and rhythmically. The wrist is flexible, and only one hand is used at a time. The position of the patient is either the standing posture with support, when the patient's abdomen should always be supported by the palmar surface of the operator's left hand; or the lying posture with the dorsal surface of the body upward. The percussion may be done on each side, across the small of the back from without inward, or from the hip to the coccyx, or from the crest of the ilium to the great trochanter, or on the posterior surface of the thigh from above downward. It is indicated in lumbago and sciatica, in weakness of the lumbar and sacral nerves, in rectal, bladder, and uterine diseases, in hypertrophy of the prostate, and in certain forms of nephritis.

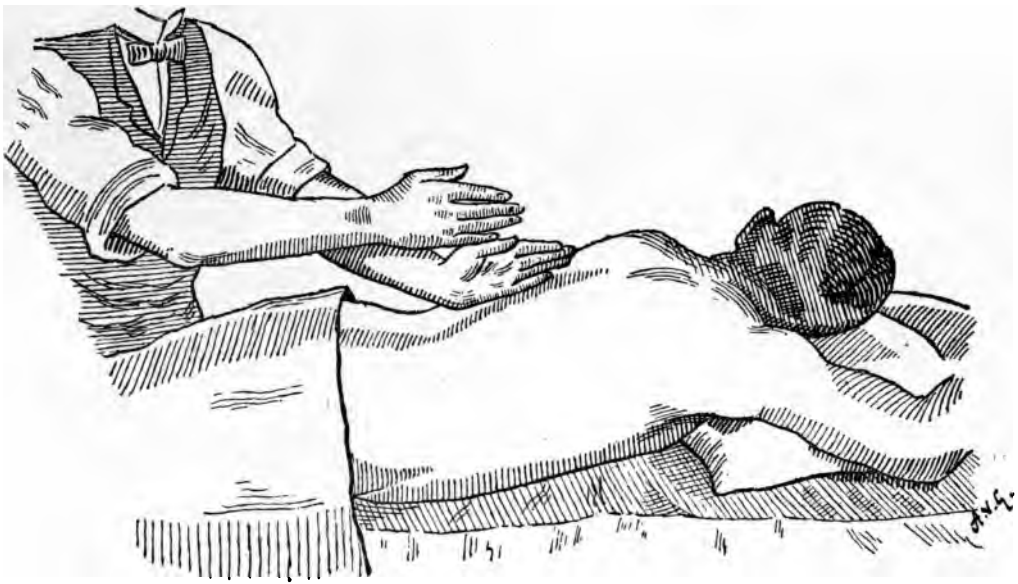

FIG. 8.—ULNAR PERCUSSION.

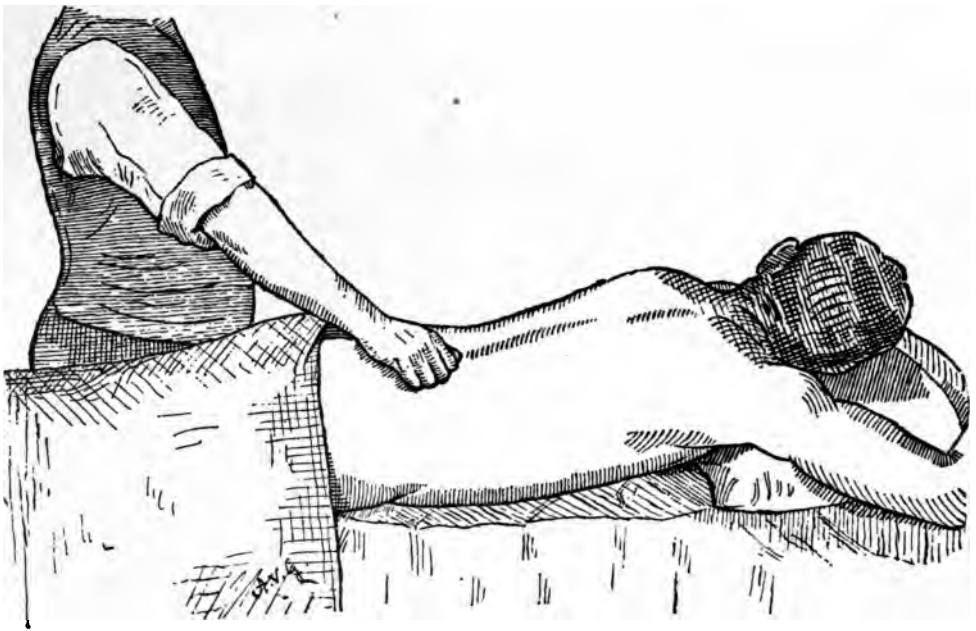

FIG. 9.—DORSAL PERCUSSION.

D. **Stretching** is the fourth variety of massage, and is divided into *palmar* and *digital stretching*.

1. **Palmar Stretching** is principally done on the extremities, and is executed in the following manner:

a. **The Lower Extremities** (Fig. 10).—The patient is placed in the lying or the reclining posture, and the operator, standing in front, grasps the patient's left or right ankle-joint with both hands, and makes steady traction in the line of the long axis of the limb.

b. **The Upper Extremities.**—The patient is placed in the lying, sitting, or reclining posture. The operator places himself on the same side of the patient as the arm upon which the stretching is done, grasps the wrist with both hands, extends the arm, and makes firm and steady traction in the long axis of the limb, being careful to keep the extremity in the shoulder plane.

2. **The Sphere of Digital Stretching** is very limited. It is used for minor parts of the body, as the fingers and toes. It can also be used in the treatment of some large nerves, as the anterior crural or the great sciatic. It is often used in dilating the *cervix uteri* in the treatment of hyperemesis during pregnancy. Either the thumb and index-finger of one or both hands, or the index-fingers of both hands can be employed.

Stretching is very useful in the treatment of fractures, dislocations, sprains, ankyloses, rheumatoid arthritis, sciatica, and other forms of neuralgia. Great care should always be observed during its application.

E. **Pressure.**—This manipulation is employed in the treatment of different nervous disorders accompanied by muscular atrophy and of motor and sensory paralysis. It may also be employed in the treatment of certain internal organs, as the kidneys, heart, liver, spleen, and

uterus. In rheumatism and neuralgia it is of great service. There are two varieties; viz., *palmar* and *digital pressure.*

1. **Palmar Pressure** is used principally on the extremities and head. The operator encloses the extremity in question in his hands, having the fingers somewhat separated. In this way a steady pressure is made from the proximal to the distal end of the extremity.

2. **Digital Pressure.**—a. *On the nerves.* The operator presses with the finger-tips of his hands, under slight vibration, on the desired nerves, going slowly from center to periphery.

b. *On a certain organ.* The operator places the finger-tips of his hands directly over the organ to be treated, and makes pressure from below upward, under some slight vibration. In this way, one may often succeed in restoring to normal the circulation in a congested liver, kidney, or uterus. It is also beneficial in the treatment of diseases of the nose, throat, and ears. Instead of digital pressure and vibration on any organ, palmar pressure and vibration may be employed. When executing digital pressure along the spinal column the direction of the manipulation should be from above downward. It must be remembered that pressure is only one of the different varieties of massage, and should never be used alone.

Pressure acts chiefly on the nerves and vessels.

F. **Vibration** is the sixth variety of massage. It is generally combined with either stretching or pressure. According to its mode of execution, vibration is divided into *palmar* and *digital.*

1. In performing *palmar vibration* the operator either grasps the extremity to be treated with both hands, and with gentle traction makes rapid oscillatory move-

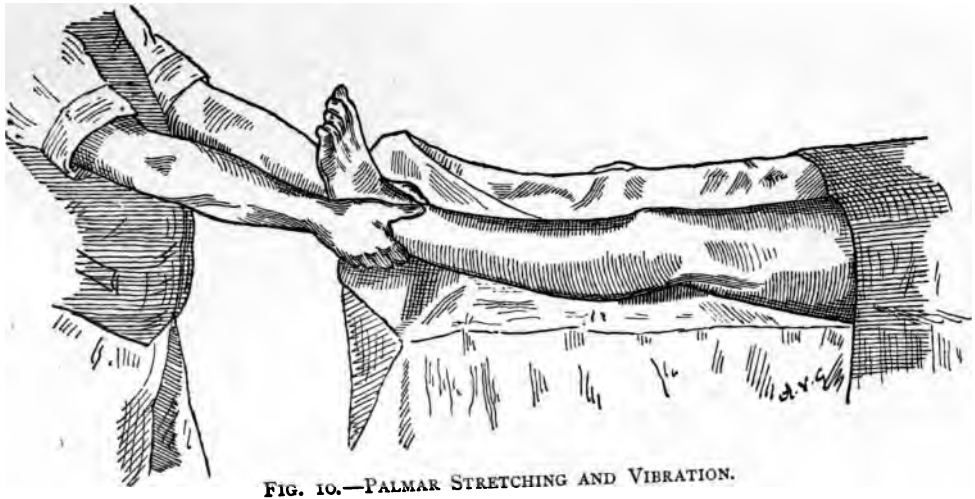

FIG. 10.—PALMAR STRETCHING AND VIBRATION.

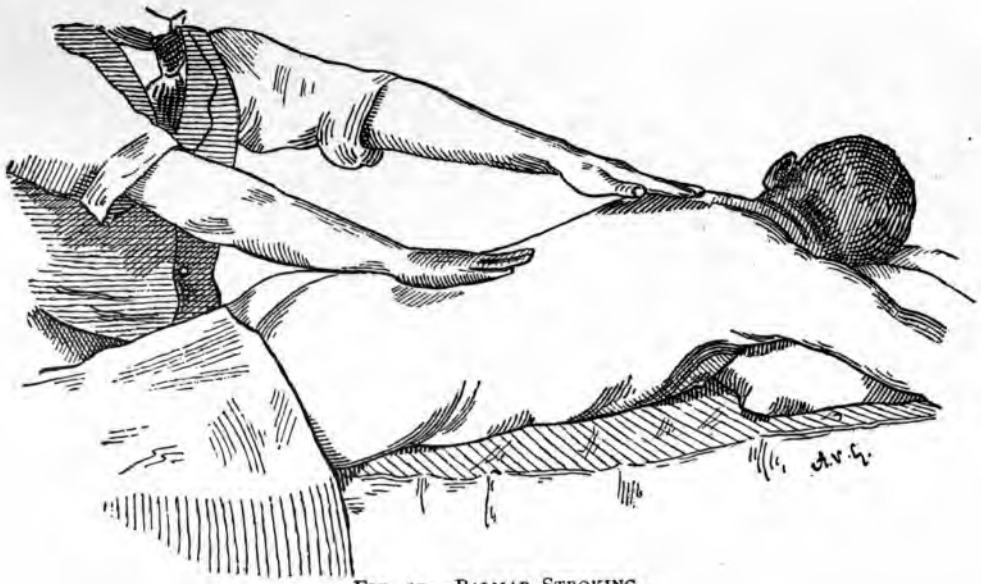

FIG. 11.—PALMAR STROKING.

ments of the limb, or, placing the palmar surface of his hand over the organ to be treated, as the heart, liver, spleen, or kidney, he makes similar oscillatory movements, and at the same time applies slight pressure.

2. **A Digital Vibration** is made with the finger-tips of either one or both hands. Generally some pressure is used at the same time. This procedure is applicable, chiefly, to the treatment of individual organs, and produces, when properly used, a stronger effect than palmar vibration. It can also be used in the affections of the spinal cord and nerves, and is then applied along the spinal column from above downward, both hands being employed.

Vibration acts principally on the nerves, on which it has a stimulating and strengthening effect. It also acts on the venous circulation.

G. **Stroking** is the last manipulation in the series of movements which constitute massage. There are two varieties ; viz., *palmar* and *digital.*

1. **Palmar Stroking** (Fig. 11) is done with the palmar surface of the hand, under slight pressure, going, when applied to the extremities, from the center toward the periphery, or in the direction of the arterial circulation. When used on the back it is performed from above downward. Sometimes, when it is employed for the purpose of hastening the absorption of fluid, as in œdema of the extremities, or in accumulation of fluid in different joints, the stroking is performed in the direction of the venous circulation ; that is, from the periphery toward the center.

2. **Digital Stroking** is executed with the finger-tips of one or both hands on some small part of the body. For instance, it is used in the treatment of the breasts after delivery, the uterus, or in synovitis of different

joints. Also, when the eyes, ears, nose, and throat are treated.

Stroking acts on the nerves and vessels of the body. On the nerves it has a mild sedative effect; on the vessels it acts by increasing the circulation.

When palmar stroking is used for the intestines, it is done in the direction from the stomach toward the rectum; that is, following the ascending, transverse, and descending colon. It can also be done on the abdomen from the median line toward each side.

Regarding the position of the patient, and the operator, Posse, of Boston, has laid down the following rules: "When applying massage the operator should place himself in such a position that he can accomplish the most with the least expenditure of energy; he should place the patient in the position which in passive movements will afford the utmost passivity. When only one hand is employed, use the right hand for the patient's right side, the left for the left. Muscles that are being *massèed* should be in relaxation."

CHAPTER VI.

A GENERAL MASSAGE TREATMENT.

Every nurse graduated from a recognized training-school with a two years' course should be so well acquainted with mechano-therapy, both practically and theoretically, as to be able to give a treatment of general massage, satisfactory to the patient, the attending physician, and herself. This is the variety of mechano-therapy which is in greatest demand in this country. It is quite frequently prescribed by physicians and surgeons, and we dare say it is of great practical value.

As we all well know, mechano-therapy is divided into two branches: massage and medical gymnastics. Massage is a series of passive movements executed on the patient's body in a variety of ways. Medical gymnastics consist of active and passive movements of the different joints of the patient's body. By a general massage treatment we understand massage of the patient's trunk and extremities, together with such medical gymnastics as can easily be executed when the patient occupies the lying posture in bed. This kind of mechano-therapy is a remedial agent not to be used alone, but together with other therapeutical agents as a part of the general treatment of a disease. Its action is general, not local. It is a restorative and not a symptomatic agent. Like cod-liver oil and iron its use is manifold. It will hasten the convalescence after pneumonia, influenza, typhoid fever, malaria, diphtheria,

scarlet fever, and measles. In a great many nervous disorders it is highly recommended. It is used as a part of the routine treatment of anæmia, chlorosis, rheumatism and gout, diabetes, phthisis, chronic nephritis, and chronic endocarditis. After surgical and gynecological operations this treatment is of great service as a general tonic. During pregnancy it is used for certain ailments, and it is often prescribed during the puerperal state. Weir Mitchell made it famous by his rest-cure. With invalids unable to take any active exercise, it is a valuable means of keeping them in a good condition. It acts by increasing the circulation of the blood, by strengthening the muscular system, as a stimulant to the digestive organs, as a mild cathartic by increasing the peristaltic action of the intestines, as a sedative to the nervous system, and as a sleep-producer.

Here, perhaps, it is only proper to state that for many of the above mentioned diseases we also have some special treatment, as respiratory exercise in phthisis, and special medical gymnastics in chronic endocarditis, etc.; but be it remembered that such a treatment does not belong to the trained nurse; it comes within the province of the specialist.

When ordered to give such a treatment the nurse should always observe a few simple rules of preparation. Her dress should be loose and free; the corset should be removed; all perfumes and strong toilet soaps should be discarded; remove all rings; the nails should be closely trimmed, and the hands scrubbed with a brush and tincture of green soap and water, and finally dried on a clean towel.

Unless otherwise ordered by the physician, the nurse should now anoint her hands with plain vaseline, cold

cream, or preferably oil of cocoanut. By using any fatty matter she saves her own strength and does not irritate her patient's skin.

The patient, wrapped in a dressing-gown or night-gown, is now placed between two woollen blankets on a bed. The patient should occupy the lying position proper. The bed should be placed in such a position in the room as not to be reached by any draughts. Let the temperature of the room be about 68° F.

Now the nurse should take her place at the right side of the bed, facing the patient, and uncovering the patient's right lower extremity she should commence the treatment, going in the following order :

1. MASSAGE.

1. **Right Lower Extremity:** friction, kneading, palmar percussion, stretching and vibration, and palmar stroking.

2. **Left Lower Extremity:** same as the right.

2. MEDICAL GYMNASTICS.

1. **Right Lower Extremity:** passive circumduction of the thigh, passive flexion and active extension of the leg, active flexion and extension of the foot, passive circumduction of the foot.

2. **Left Lower Extremity:** same as the right. The circumduction of the foot is only a false or incomplete one. The time used for each extremity should not exceed eight minutes.

1. MASSAGE.

1. **Right Upper Extremity:** friction, kneading, palmar percussion, stretching and vibration, and palmar stroking.

2. **Left Upper Extremity:** same as the right.

2. MEDICAL GYMNASTICS.

1. **Right Upper Extremity:** passive circumduction of the arm, passive flexion, and active extension of the forearm, passive extension and active flexion of the hand, passive circumduction of the hand.

2. **Left Upper Extremity** same as the right.

The circumduction of the hand is only a false or incomplete one. The time used for each extremity should not exceed eight minutes.

1. MASSAGE.

1. **Chest:** friction, kneading, ulnar percussion, and palmar stroking.

The time used for the chest should not exceed five minutes.

2. **Abdomen:** friction, kneading, ulnar percussion, palmar stroking of the ascending, transverse, and descending colon, and palmar stroking from the median line outward.

2. MEDICAL GYMNASTICS.

Abdomen: active abduction and adduction of the thighs with flexed legs, passive circumduction of the thighs.

Time for abdomen, eight minutes.

1. MASSAGE.

Back: friction, kneading, ulnar percussion along the spinal column from above downward, and palmar stroking. Time, eight minutes.

After this treatment, as a finishing touch, it is highly recommended to rub the patient quickly and gently with some alcohol, bay rum, or eau-de-cologne on a rough towel in order to remove some of the fatty matter. Alcohol of 95 per cent. strength is to be preferred.

Now cover up the patient, raise the windows a little, darken the room, and leave the patient to rest for at least fifteen or twenty minutes.

Never give this treatment to a patient on an empty stomach, and always let one hour elapse since the last meal.

The first treatment should last but twenty minutes and should only consist of massage. Then gradually increase the time and add medical gymnastics, first some passive, and then some active movements, in such a way that at the eighth treatment fully forty-five minutes are occupied, and a complete treatment is given. Never let a treatment exceed one hour. The full course is generally two months with one séance daily.

Should this treatment be discontinued during the menstrual periods? Not necessarily, but always let the attending physician decide this question.

Do not worry the patient by unnecessary talking. Let the nurse save her power as a brilliant conversationalist for a better occasion. Insist upon it that the nurse and patient should be left alone in the room, and, if possible, the nurse should try to impress upon the patient's mind that by quietly submitting to the treatment the desired effect will undoubtedly be obtained.

If I were to indicate the proper time for such treatment, I would unhesitatingly pronounce the early forenoon as the most suitable part of the day. In nervous diseases we must make an exception to this rule, and here I advise the treatment to be given in the evening. In phthisis, where respiratory exercise is also used, the special treatment should be given one hour after breakfast and the general massage at bedtime. By this we will secure a good night's rest, and often be able to check the night-sweat. In all chronic diseases where we wish to combine special treatment with general treatment, the special should be given in the morning after breakfast, and the general at bedtime.

Of course, any change in the above programme may be made according to circumstances. Above is only given a short description of a general massage treatment, as it is usually executed, but the attending physician should be the judge regarding the time and the different manipulations in each case.—Reprinted from author's article in *The Trained Nurse,* February, 1897.

CHAPTER VII.

DISEASES OF THE RESPIRATORY ORGANS.

TUBERCULOSIS PULMONALIS.

Tuberculosis and the various preparations of anti-tubercle-serum have so far not given any brilliant results as curative agents, although they have opened the way for researches. In the serum treatment, or in a treatment based upon similar principles, our hope is concentrated, and some day in the future it will perhaps solve the problem, and furnish a rational treatment for the cure of this disease. To-day, a successful treatment must be founded on natural law. Either an inherited or acquired constitutional weakness, which finally becomes progressive, is to be found in a majority of patients suffering from this disease. The soil is prepared for the reception of the tubercle bacilli, and when once it is comfortably settled in the lungs, these weakened organs can offer little or no resistance to the ravages of the unwelcome guest. Our efforts must now be so directed as to stop the general progressive weakness, to strengthen the respiratory organs, and to alter the soil into one which is unfavorable for the tubercular development. By a judicious use of fresh air, sunshine, a suitable climate, wholesome and nutritious food, together with proper drugs, water, and exercise, we will often succeed in preventing the disease, in checking it and in prolonging life, and sometimes in effecting a permanent cure. The tubercle tends to fibrous formation, to cica-

trization and healing if properly received and taken care of. Regarding the exercise, it must be regulated to suit the physical condition of each individual case, and it must be under the control of the physician, not the patient. Now, the question will arise, what kind of exercise should a patient suffering from phthisis take? Our answer is: when the patient first comes under observation a course of mechano-therapy should be established with daily séances. With proper care this can be done in every case. And when the patient's strength returns, and the hope of cure enters his heart, then is the time when out-door exercise should be combined with medical gymnastics and massage. We must remember there are three contra-indications to active exercise in pulmonary tuberculosis, namely: fever, hemorrhage, and extreme debility. Properly given, mechano-therapy will assist nature to overcome these abnormal conditions, and to lay up a stock of potential energy. The late Dr. Alfred L. Loomis, of New York, used to lay great stress upon the rule, that active out-door exercise was positively contra-indicated in phthisical cases when the temperature rose to 100° F. or above. Undoubtedly, patients suffering from tuberculosis pulmonalis are best treated in proper sanitariums. In most of them, especially those abroad, medical gymnastics and massage constitute important factors in the routine treatment. As we all know, **mechano-therapy** is the mode of treating diseases by movements. It is a science both in theory and in practice, and it is founded on purely scientific researches, discoveries, and facts. Its path runs parallel to, and in close contact with, physiology, anatomy, and pathology. It is divided into two branches: *medical gymnastics* and *massage*. By medical gymnastics we un-

derstand that branch which deals with active and passive movements of different joints of the body. Massage is a series of passive movements executed on the patient's body in a variety of ways, and constitutes the other branch of mechano-therapy. Finally, by respiratory exercises or movements, we understand such medical gymnastics which will strengthen and develop the respiratory muscles and elastic lung-tissue. Here we will give a short schedule of the principal respiratory movements as recommended by the foremost men in Europe engaged in the practice of mechano-therapy:

1st Group. Mild.	a. Passive chest-lifting (passive movement). b. Active chest-lifting (simple active movement). c. Active expansion of thorax (simple active movement).
2d Group. Medium.	a. Circumduction of arms in abduction (passive movement). b. Circumduction of arms in extension (passive movement).
3d Group. Strong.	a. Flexion and extension of trunk under resistance (complicated active movement), b. Flexion and extension of arms under resistance (complicated active movement). c. Abduction and adduction of arms under resistance (complicated active movement).

When performing b and c of the first group the patient occupies the standing posture. The other respiratory movements are generally executed with the patient placed in either the sitting or the astride-sitting posture.

In the treatment of tuberculosis pulmonalis the use of mechano-therapy is governed by the following rules:

1. When the patient is suffering from great weakness,

hæmoptysis, and pyrexia, *the general massage treatment* only should be employed.

2. When the patient is comparatively free from these symptoms give the *special treatment*, consisting of respiratory movements and local massage, in the forenoon, and *general massage* in the evening.

3. The respiratory movements should be used either in the open air, or in a large, sunny, and properly ventilated room; the general massage should be given in the patient's sleeping apartment at bedtime.

4. In using respiratory movements commence with the milder ones, and slowly increase the strength and time of the treatment.

5. The respiratory movements should follow the rhythm of an ordinary respiration; viz., a slow inspiration and a somewhat quickened expiration. Always let the expiration be followed by a prolonged pause.

Action of Respiratory Movements:

a. When the chest expands (for inspiration) the viscera are drawn toward the chest, and the circulation of blood in the larger veins is hurried up. In certain movements the suction in the vena cava becomes from five to six times as great as during ordinary respiration. During the expiratory act there is a retardation of the venous current while the arterial circulation is somewhat accelerated.

b. The tidal volume of air passing in and out of the lungs is increased, and the amount of oxygen taken in is thereby increased.

c. The depth rather than the number of respirations is increased.

d. The respiratory muscles and the elastic lung-tissue are developed and strengthened.

The local massage consists of friction and kneading

of the chest and back; ulnar percussion of the chest; palmar percussion of the back, and palmar pressure and vibration of the thorax.

Action of Local Massage:

a. The circulation of the blood in the bronchial arteries is increased, and more nutriment is brought to the vesicular tissue of the lungs; consequently it will increase this tissue in strength, elasticity, and distensibility.

b. The air-cells and capillaries are put into an oscillation, which will bring the air and blood into a more intimate relationship, and make the diffusion of oxygen and carbonic acid more perfect.

c. It will dissolve the mucus and aid the expectoration.

d. It will break up old pleuritic adhesions.

Action of the General Massage:

a. Stimulation of the different functions of the body.

b. The night-sweats will be checked.

c. It acts as a mild sedative on the nerves.

d. It produces sleep.

Although a science in itself, it must be borne in mind that mechano-therapy is only a remedial agent to be used by the physician as a part of the general treatment, and when used with judgment, patience, and skill, it will only aid Nature in her battle against this disease.—Reprinted from author's article in *New York Medical Times*, June, 1898.

CHRONIC BRONCHITIS.

In the treatment of this disease medical gymnastics in the form of respiratory movements, together with general massage, are employed. The purpose of the

treatment is to increase the activity of the respiratory organs and muscles, to relieve congestion of the lungs, and to stimulate digestion.

PULMONARY EMPHYSEMA.

By the employment of mechano-therapy in the treatment of this disease our intention is not so much to effect a cure, which, perhaps, would be doubtful, but to relieve the symptoms, and to enable the patient to enjoy comparatively fair health. Experience has taught us that any disturbance of the digestive organs will aggravate the symptoms; therefore, part of the treatment should be directed to keeping the digestion in good order. We should also strive to prevent hypertrophy and dilatation of the right ventricle, and, a general tonic should be given. Such a treatment should be divided into the *special* and *general.*

Special Treatment:

1. Passive chest-lifting.
2. Circumduction of the thighs.
3. Rotation of the trunk.
4. Flexion and extension of the trunk.
5. Digital kneading and palmar stroking of the intestines.
6. Palmar pressure and vibration of the thorax.
7. Ulnar percussion of the chest.
8. Flexion and extension of the feet.
9. Circumduction of the arms.

The General Treatment consists of general massage.

BRONCHIAL ASTHMA.

Professor T. J. Hartelius, of Stockholm, recommends a very complicated prescription of movements to be used in the treatment of this disease. Our belief is that we can obtain good results by the use of respiratory movements only, together with vigorous massage of the chest and the upper part of the back. In this opinion we are sustained by the reports of several prominent medical men. In addition to this treatment a general massage may be given as a tonic.

CHRONIC ADHESIVE PLEURISY.

In this abnormal condition a treatment similar to that one above can be used with great advantage.

CHAPTER VIII.

MOVEMENTS AND CARDIAC DISEASES.

Since the days of Peter Henrik Ling, the father of mechano-therapy, this science has been employed as an agent in the treatment of different heart diseases with more or less success. During the latter part of this century great advancement and many discoveries have been made in all the sciences connected with medicine. This is also true regarding mechano-therapy. When the champions of mechano-therapy first began to advocate the use of movements for the relief and cure of cardiac diseases, they met with great opposition, contempt, and ridicule. But gradually they fought their way, gaining one victory after another, and proving both by theory and by practice, by clinical facts and by records, that their science was an agent not to be discarded. To-day, we must certainly acknowledge their claim. To-day, mechano-therapy is not only equal, but superior to many medicinal agents in the treatment of cardiac troubles. Here, let us stop for a moment to consider the effects of movements upon the heart and circulation. As we have stated before, some movements improve the circulation without increasing the heart action, others increase the circulation and heart action at the same time. Passive movements belong chiefly to the first group, and active to the last. Still, certain active movements, performed by the patient in some resting postures, may also be classified under

the first class. As an example of the first group may be mentioned the following movements ; viz., passive and mild active respiratory movements, passive circumduction and rotation of different joints, different varieties of massage as friction, kneading, percussion, pressure and vibration, especially on the chest and back, centripetal stroking, and finally active movements of the lower extremities. But it must always be borne in mind that each individual case requires its own special treatment, and if the treatment is carried too far as regards time and strength, the result will be harmful instead of beneficial. Professor Chr. Loven, of Stockholm, Sweden, in a scientific article in *Hygiea* (1875), explained that the effect of certain movements on the circulation of the lymph was to quicken it, without having any irritating effect on the heart. In cardiac diseases, as hypertrophy, dilatation, fatty degeneration and infiltration, neurosis, and valvular lesions, the principal thing the overworked organ needs is, perhaps, rest. By giving rest we give it relief and an opportunity to be cured. Therefore, anything that will relieve the heart from some of its work will put it on the road to recovery. Movements carefully selected and scientifically executed will increase the circulation of the blood and lymph without disturbing the cardiac action, and by their employment the heart is given a well-needed rest and a chance of improvement and, perhaps, of recovery. The left side of the heart, having less resistance to overcome, is given an opportunity to empty itself without such a great effort, and the right side of the heart is relieved through the increased circulation in the pulmonary arteries. During this period of comparative rest the blood is flowing with renewed force in the coronary arteries, bringing nutriment to the

weak and degenerated muscles and tissues of the heart. Local congestion is relieved, and the depressor and accelerator nerves governing the function of the heart are kept well balanced. Disturbance in surrounding organs and symptoms of the cardiac disease are relieved, and the general health is improved. The contra-indications to the treatment of heart diseases by movements are advanced arterio-sclerosis, aneurism, and decided degeneration of the cardiac muscle. We certainly cannot expect to restore a seriously impaired valve to its normal condition, or to cure a true case of angina pectoris, etc., but we can relieve the symptoms, improve the health, bring comfort to the sufferer, and prolong his life.

At present there are three different methods of mechano-therapy practised for the relief and cure of diseases belonging to the heart. The system taught and practised by the Royal Gymnastic Central Institute, Stockholm, Sweden; Widerstands Gymnastik in connection with hydro-therapy as introduced by the late Doctor August Schott; and, finally, an independent system, being a modification of that one advocated in Stockholm. But, it must be remembered, that the last two are only branches of the first mentioned; only sects, so to speak.

(A.) At the Royal Gymnastic Central Institute of Stockholm, the treatment is very thorough and scientific indeed, but rather too complicated, as everything must be, more or less, when only one branch of therapy, or one kind of treatment is practised. In the clinics connected with this college diseases are treated by movements only. It is a *pure specialty*, with all its advantages and dangers. Different prescriptions of movements are here used for different diseases of the heart. So hyper-

trophy, dilatation, fatty heart, angina pectoris, and valvular lesions are treated differently. The results obtained are very good, as the annual reports of this institution will show. The following prescription, selected because of its simplicity, is used in this institute in the treatment of cardiac dilatation, and may serve as an example.

1. Palmar vibration and pressure of the chest; reclining posture.

2. Circumduction of the feet; same posture.

3. Passive flexion and extension of the fingers; same posture.

4. Circumduction of the thighs; same posture.

5. Active flexion and extension of the feet; same posture.

6. Circumduction with arms extended; astride-sitting posture.

7. Ulnar percussion on the cardiac region; reclining posture.

8. Ulnar percussion along the spinal column; standing posture with support.

After each movement, active or passive, chest-lifting is performed.

(B.) The treatment of heart diseases by baths and movements was first introduced by Doctor August Schott, of Bad Nauheim, Germany. As stated above, it is only a combination of mechano-therapy and hydrotherapy. Although being a comparatively new method, it has been accepted by the medical profession as having a certain value. The results so far are quite favorable, and the reports promising. The water of the Bad Nauheim Springs is naturally effervescent (Sprudelbad). It contains sodium chloride, calcium chloride, salts of iron, and a variable proportion of carbonic-acid gas.

The natural temperature of these springs is from 88° to 95° F. Artificial baths can be prepared producing an effect similar to the natural ones. The bath is given daily, every other or third day, usually in the forenoon, and followed by movements, after which the patient is allowed to rest in the recumbent posture for about one hour. The movements are active, and the operator usually resists the patient's attempt in executing them. This resistance is done by the palmar surface of the hands; the operator should not grasp any part of the patient's body and thereby constrict the circulation in this part. They are performed slowly and without any exertion. After each movement the patient should rest for a moment, and during the séance the patient must be directed to breathe regularly. The movements should be stopped if the patient experiences any distress in breathing, palpitation of the heart, or feeling of discomfort, or if the pulse shows any sign of weakness, or of intermission. The rule laid down is to commence slowly and advance slowly. Begin with a treatment lasting about ten minutes, and then increase gradually until about thirty minutes are occupied, including movements and rest. The treatment can be repeated again in the afternoon, but in such cases it must be shorter in duration, and milder in its effect than the one given in the forenoon. The usual course consists of twenty-five treatments, baths, and movements, extending over a period of about five weeks.

Programme of a séance of Widerstands-Gymnastik as practised at Bad Nauheim.

1. The patient is placed either in the standing or in the sitting posture. During the first three or four treatments the sitting posture is generally used, afterward the standing posture. The operator stands in

front of the patient, ready to assist and resist him. The movements are complicated active; they are slowly executed by the patient against slight resistance of the operator. No movement is repeated, and after each movement the patient resumes the standing or sitting posture.

2. **Movements with the Shoulder-joint.**

a. Abduction and adduction of the arm.

b. Flexion of the arm.

c. Flexion, extension, and hyper-extension of the arm.

d. Rotation of the arm.

3. **Movements with the Elbow-joints.**—a. Flexion and extension of the forearm.

b. Pronation and supination of the forearm.

4. **Movements with the Wrist-joint.**—a. Flexion and extension of the hand.

b. Abduction and adduction of the hand.

5. **Movements with the Finger-joints.**—a. Flexion and extension of the fingers.

b. Abduction and adduction of the fingers.

6. **Movements with the Joints of the Spinal Column.**—a. Flexion and extension of trunk.

b. Abduction and adduction of the trunk.

c. Rotation of the trunk

7. **Movements with the Hip-joint.**—a. Flexion of the thighs.

b. Extension and hyper-extension of the thighs.

c. Abduction and adduction of the thighs.

8. **Movements with the Knee-joint.**—Flexion and extension of the leg.

9. **Movements with the Ankle-joint.**—a. Flexion and extension of the foot.

b. Abduction and adduction of the foot.

When performing movements with the shoulder and

hip-joints, the elbow and knee-joints are extended. In movements of the upper extremities, both arms take part at the same time.

(C.) Followers of the last system claim that only one prescription or variety of mechano-therapy is of any real value in the treatment of cardiac disease, be it a fatty or a dilated heart, chronic endocarditis or angina pectoris; the action and the result must be the same. Such a treatment has been divided into two divisions:

1. The special treatment, which directly affects the heart; and

2. The general treatment, which acts on the body at large as a general tonic.

According to their theory the general treatment takes the place of the baths used by the second method; that is, they substitute the general treatment for the baths. The special treatment, again, consisting of a variety of movements, is really a modification of the different prescriptions used by the first school. It is, perhaps, a simplified treatment used in all cardiac diseases. They believe that the patient should not be disturbed by too many changes of postures when undergoing a treatment. The sitting, astride-sitting, and reclining postures are chiefly used. The general treatment consists of a mild general massage.

Special Treatment.—1. Gently given respiratory movements.

2. Friction and kneading of chest muscles.

3. Ulnar percussion on the cardiac region of the chest in a small circle from right to left, upward, across, downward, and across (Posse).

4. Circumduction of the trunk.

5. Palmar vibration and pressure on cardiac region or of the thorax.

6. Circumduction of the thighs.
7. Circumduction of the hands.
8. Circumduction of the feet.
9. Gently given respiratory movements.

Between each movement a pause should be made.

Begin with a few movements only, and gradually increase. Let the first sitting occupy only ten minutes. Never extend the séance over half an hour. Carefully watch the cardiac action, and the pulse before, during, and after the treatment. Give the special treatment in the forenoon, and the general massage in the evening. Use only passive medical gymnastics in connection with the general treatment. Do not neglect the medicinal treatment, or any therapeutic measure, by which the patient may improve or be benefited. Always let the patient rest in the recumbent posture after each treatment.

CHAPTER IX.

MECHANO-THERAPY USED IN THE TREATMENT OF RHEUMATISM AND GOUT.

In this chapter we will shortly review this science in connection with :

1. Acute articular rheumatism.
2. Chronic articular rheumatism.
3. Rheumatoid arthritis.
4. Gout.

1. **Acute Articular Rheumatism.**—According to Dr. F. Le Roy Satterlee, of New York City, mechano-therapy should not be used until the inflammatory symptoms have subsided. Experience and clinical observations have proven the truth of this rule. When the disease has progressed to such a stage, gentle local massage, combined with mild general massage, may be used, gradually adding passive and active medical gymnastics of the different joints affected. Great care should be taken or some traumatic arthritis may result. If this disease is complicated by high pyrexia, with cerebral manifestations, general massage, consisting chiefly of friction, kneading, and percussion, may be of some service when the patient is immersed in a cold bath.

2. **Chronic Articular Rheumatism.**—In connection with this abnormal condition mechano-therapy can be divided into the local and the general treatment.

The local treatment is used to relieve the purely local symptoms, and the general treatment takes the place of a general tonic. Friction, kneading, percussion, pressure, stretching, vibration, and centripetal stroking constitute the local treatment. Generally some fatty liniment or substance is used in order to prevent irritation of the patient's skin. Some passive and active medical gymnastics of the affected joints should gradually be added to the massage. Brandt, Hartelius, Graham, Satterlee, Manalongo, Wallbridge, and others, all unite in proclaiming the high therapeutic value of movements, active and passive, in the treatment of chronic articular rheumatism. The physiological action of mechano-therapy in this disease is to increase the circulation of blood and lymph in the joints treated, to hasten the removal of waste matter, to reabsorb morbid deposit and effusion, either serous or fibrinous. Mechanically it gradually stretches and breaks adhesions between the sheaths of the different tendons, between the ligaments and the articular surfaces of the bones entering into the formation at the joints. The general massage improves the general health, prepares the way and facilitates the local treatment. The time of a local treatment should not exceed thirty minutes, and, preferably, it should be given in the forenoon. The general massage in these cases is most beneficial if given in the evening.

3. **Rheumatoid Arthritis.**—Again we will quote from Satterlee, who, by his scientific investigations and writings on mechano-therapy in connection with rheumatism and its different varieties, has greatly influenced the introduction of this science into America: "General massage, and the systematic movements of all the joints, as by the Swedish method, are among the

most valuable adjuncts to the systematic treatment, and should be faithfully pursued over an extended period, from two to six times a week, and used for half an hour or an hour at each application." In order to accomplish the most favorable results the general massage should, in our opinion, be given every day, and let the different manipulations increase gradually in strength, especially the muscular kneading, as thereby atrophy is prevented. By using the local treatment, which consists of local massage and medical gymnastics, we are often able to fight successfully the dreaded enemies, deformity and ankylosis. Should ankylosis already have occurred, and it is always a false one in the beginning, the patient may be given an anæsthetic of ether or chloroform, and the adhesions broken by the forcible execution of passive movements. If any inflammation should occur the local application of ice will in a short time restore the normal condition. Rarely in such cases must the daily treatment be interrupted more than a few days. It has been recommended to use cod-liver oil in the different manipulations to increase the nutrition of the body.

4. **Gout.**—By a scientific regulation and execution of mechano-therapy, of course always in connection with other therapeutic agents, we are often able to keep this disease under control. The acute attacks may be shortened, in the subacute state the stiffness and tenderness of the joints will be overcome, and, finally, during the periods between the attacks the gouty tendency in the patient will be lessened.

In an acute attack the manipulations must necessarily be local, and performed with great care and gentleness. The use of oils or liniments is here indicated, but only in order not to irritate or break the tender skin.

The different manœuvres should consist of friction, kneading, vibration, and stroking—all centripetal in character.

During the subacute state our effort must be directed to overcome the stiffness, swelling, tenderness, and chronic inflammation of the different joints; to aid digestion, secretion, and excretion, and to increase the general nutrition. Local massage and medical gymnastics in connection with the general massage will now constitute the treatment.

Finally, during the periods of comparatively good health between the attacks, the following prescription of movements will be of service:

1. Circumduction of the arms in extension.
2. Rotation of the trunk.
3. Flexion and extension of the thighs and legs.
4. Flexion and extension of the trunk.
5. Abduction and adduction of the thighs.
6. Kneading and stroking of the intestines.
7. Circumduction of the thighs.
8. Dorsal percussion on the sacral region of the back.
9. Passive chest lifting.

CHAPTER X.

DISEASES OF THE URINARY ORGANS AND THEIR TREATMENT BY MECHANO-THERAPY.

Under this rubric we will briefly review the treatment as used for :

1. Chronic nephritis.
2. Displaced kidney.
3. Incontinence of urine.
4. Diseases of the prostate gland, although diseases of that organ belong more properly to diseases of the generative organs.

1. CHRONIC NEPHRITIS.

Although in the majority of cases the prognosis is unfavorable, and a cure rarely obtained, massage and medical gymnastics are of decided value in the therapy of this disease, not only improving the general health and relieving the distressing symptoms, but often prolonging life. The treatment has been divided into the special and general parts.

Prescription for the Special Treatment.

1. Passive chest-lifting ; astride-sitting posture.
2. Dorsal percussion on the lower part of the lumbar and on the sacral regions of the back ; standing posture with support.
3. Circumduction of the thighs ; reclining posture.
4. Digital kneading of the muscles and organs in the

right and left hypochondriac, and in the epigastric regions of the abdomen ; dorsal posture.

5. Circumduction of the trunk; astride-sitting posture.

6. Upward pressure and vibration over the kidneys ; dorsal posture.

7. Abduction and adduction of the thighs ; dorsal posture.

8. Palmar pressure and vibration of the bladder ; dorsal posture. The hands to be applied on the hypogastric region just above the pubic arch.

9. Circumduction of the arms ; astride-sitting posture.

A general massage treatment may be given in the evening, but the special should take place in the forenoon.

2. DISPLACED KIDNEY.

In order to clearly and satisfactorily understand the object of such treatment, and to grasp the principles upon which it is based, the reader is invited to take a short review of the etiology, the morbid anatomy, and the principal symptoms of a displaced kidney.

Women suffer more from it than men, and virgins, nulliparæ, and multiparæ being alike its victim. The right kidney is more frequently displaced than the left, but sometimes both occupy an abnormal position and are movable.

Taking the right kidney, as being the one most commonly displaced, it rests in its normal position upon the fascia covering the quadratus lumborum and the psoas magnus muscles. It is supported partly by the peritoneum, and partly by the abdominal muscles,

and is intimately surrounded by fat and loose areolar tissues, which connect it to the descending portion of the duodenum, and the upper part of the ascending colon, and to the above-named muscles, thereby fixing it in place. **(Normal Kidney.)**

Should now the peri-renal fat and loose areolar tissues from any cause be absorbed or undergo atrophy, the kidney would be movable within a certain limited space, and only anchored behind the peritoneum by its vessels, nerves, and ureter. **(Acquired Movable Kidney.)**

Such a condition may also, with slight modification, be a congenital one. **(Congenital Movable Kidney.)**

Further, if the abdominal muscles should become relaxed from general muscular weakness, as in virgins and nulliparæ, or from frequent child-bearing, as in multiparæ, the kidney will undoubtedly sink somewhat in the abdominal cavity, surrounded by a fold of the also relaxed peritoneum. And if to this be added the effects of a fall, a sudden jump, the lifting of a heavy burden, a long-continued attack of severe vomiting or other violent straining, as parturition, the kidney will be still further displaced. **(Acquired Floating Kidney.)**

It is conceivable that such an abnormal condition may also be congenital. **(Congenital Floating Kidney.)**

In such position it may become fixed either by formation of new connective tissue, by peritoneal adhesions, by infiltration of fatty tissue, or by contraction of some of the abdominal parietes. **(Acquired or Congenital Fixed Displaced, or Dislocated Kidney.)**

Finally, in the downward excursions and ramblings of the kidney, an obstruction of the ureter sometimes oc-

curs, caused either by stretching, pressure, or twisting.

(Strangulated Displaced Kidney.)

Among etiological factors great stress must be laid upon a certain tendency to this disease resulting from an inherited vice of constitution, accompanied by a weak muscular system. This predisposition will be further developed by anti-hygienic surroundings, by want of physical training, and by a faulty mode of living. In addition to the foregoing causes improprieties of dress, wasting diseases, long-continued illness, and violent and excessive coitus may also be cited. Such acute inflammation of the kidney as first increases it in size, followed by rapid shrinkage, is reported to be one of the causes of displacement.

As long as the displacement is slight, the patient generally suffers little inconvenience, but when the kidney becomes more movable or sinks deeper into the abdominal cavity, pain and misery result, and real danger is often at hand. The support gives way, and the vessels, nerves, and ureter, forming a pedicle, are put on the stretch; their respective diameters are lessened, and, finally, their different functions are impaired. Again, the displaced right kidney, either by direct pressure or by traction upon the descending part of the duodenum, the ascending colon, or some other part of the intestines, causes gases and fluids to accumulate above the point of pressure or traction. Further, the normal arrangement of the peritoneum will be interfered with, and it will be considerably stretched. It is claimed that "the symptoms are principally produced by pressure, traction, stretching, and irritation of the *solar plexus* and its various parts and branches." But even if this theory is correct, the right conclusion would certainly be that the greater the pressure, traction, stretch-

hand, and you will, finally, be able to perform ballottement.

7. Open your left hand gently, and the kidney will be distinctly felt to slip up, behind the liver, into its proper place.

Before beginning the examination the examiner should anoint the fingers of his right hand with vaseline, thereby greatly facilitating the manipulations.

Professor T. J. Hartelius, late of the Royal Gymnastik Central Institute, Stockholm, Sweden, writes in his text-book of medical gymnastics and massage, "that if the theory stands that the principal cause of this disease is to be found in the relaxation of the abdominal muscles, the object of the treatment by mechano-therapy must be to strengthen and develop those muscles, and to improve the general health."

Keeping in mind the anatomical and pathological conditions of a displaced kidney, the object of such treatment should be :

1. To replace the kidney in its normal position.
2. To relieve it from abnormal pressure from above.
3. To increase the fat and loose areolar tissues surrounding it.
4. To produce contraction of the relaxed peritoneum and re-establish its elasticity.
5. To strengthen the weak and relaxed abdominal muscles.
6. To improve the general health.

We do not hesitate to claim that the scientific and conscientious use of mechano-therapy combined with rest, good diet, and proper tonics will achieve the desired result ; viz., improvement of the patient's health, a symptomatic, and, perhaps, an anatomical cure.

Certainly, there are cases where such treatment is

contra-indicated, as when the weight of the kidney is increased either by new growths, calculi, or hydronephrotic cysts independent of the displacement, or when the kidney is the seat of tubercular or suppurative diseases, or when the displacement has become fixed, or when it is complicated by severe uterine disorders requiring perfect rest, or by abdominal tumors or pregnancy, or, finally, when the patient suffers in addition from phthisis or cancer.

Thure Brandt has for several years past successfully treated displaced kidney by mechano-therapy. Eisenberg, of Vienna, reports that he has by this method obtained most happy results. The reports of the above mentioned institute in Stockholm add many testimonials in favor of this treatment. Dr. Weir Mitchell, of Philadelphia, has succeeded in considerably improving the condition of patients suffering from this affection by means of rest and general massage.

In the treatment of uncomplicated cases the following rules may be of service :

1. Always be sure that the kidney occupies its normal place before any movements are given.

2. Never use any movements which will increase pressure from above.

3. Ulnar percussion along the spinal column followed by palmar stroking ; standing posture with support.

4. Rotation of the trunk ; astride-sitting posture.

5. Flexion and extension of thighs and legs ; reclining posture.

6. Flexion and extension of the trunk ; astride-sitting posture.

7. Circumduction of the thighs ; reclining posture.

8. Upward pressure and vibration of the kidney ; repeated five or six times, with patient in dorsal posture.

9. Massage of the abdominal muscles.

10. Massage of the upper and lower extremities.

11. Massage, including dorsal percussion, of the back.

12. Let each sitting occupy about forty minutes, and give one séance daily. Keep the patient in bed during the first six weeks, and let the course last about three months.

It is claimed that "systematic exercise in expanding the thorax and developing the respiratory muscles will elevate and sustain the kidney in proper position." But every pressure from above, as from the expanded lungs, from the diaphragm suddenly depressed, or from a liver pressed downward, will certainly increase the displacement, and consequently should be avoided with the greatest care in the treatment of a kidney already displaced. Systematic exercise in the form of educational gymnastics, taken for the purpose of developing the muscular system, must be considered as a true prophylaxis of this disease, but not as a restorative.

3. INCONTINENCE OF URINE.

This abnormal condition is met with both in children and adults. For its occurrence in children see a subsequent chapter.

The causes of incontinence in adults are either **atony** of the bladder, wherein its muscular fibres having lost their tone are unable to expel the urine, or **paralysis,** depending upon exhaustion, injury, or some organic diseases of the nervous system. In either of these cases mechano-therapy may be of some service.

General massage, in connection with the following special treatment, should be tried :

1. Ulnar percussion along the spinal column ; standing posture with support.

2. Pressure and vibration on the hypogastric region above the pubic arch ; dorsal posture.

3. Abduction and adduction of the thighs ; same posture.

4. Pressure and vibration on the perineum ; same posture.

5. Dorsal percussion on the lower part of the back ; standing posture with support.

6. Digital pressure and vibration of the spinal column, followed by palmar stroking ; same posture.

4. DISEASES OF THE PROSTATE GLAND.

Only chronic inflammation and hypertrophy of this gland are influenced by a course of mechano-therapy.

General massage should be given as a tonic together with a special treatment of the following nature :

1. Direct massage of the gland through the rectum, consisting of digital friction, kneading, pressure, vibration, and stroking; Fuller's posture.

2. Pressure and vibration on the hypogastric region just above the pubic arch ; dorsal posture.

3. Dorsal percussion on the lower part of the back ; standing posture with support.

4. Pressure and vibration on the perineum ; dorsal posture.

5. Abduction and adduction of the thighs ; same posture.

6. Ulnar percussion, and palmar stroking along the spinal column ; standing posture with support.

CHAPTER XI.

CHRONIC CONSTIPATION.

The causes of chronic constipation in adults can be classed as general and local.

Among general causes, the following may be mentioned:

1. Sex: women are more disposed than men.
2. Sedentary habits, commonly found among brain-workers.
3. Constitutional peculiarities, often being a family complaint.
4. Constant neglect of a habit of regularity.
5. Persistent taking of purgative drugs.
6. A coarse diet, leaving too much residue, or food that contains but little waste.
7. Certain diseases, such as anæmia, neurasthenia, hysteria, and chronic affections of the liver, stomach, and intestines.
8. Acute fevers.
9. Wasting diseases.

Local causes may be:

1. Deficient action of the small intestines due either to deficient secretion or to want of innervation or muscular power.
2. Deficient action of the large intestines depending chiefly upon deficient innervation.
3. Certain abnormal conditions of the rectum only.
4. Weakness of the abdominal muscles, either in

obesity or from over-distention in often-repeated pregnancies.

5. Pressure of tumors.

6. Strictures.

7. Compressure of the rectum by a turgid womb, a retroverted or retroflexed uterus, the prolapse of an ovary.

8. Menopause.

To deal successfully with this trouble we must carefully examine and study each case. In order to devise a plan of rational treatment we must first ascertain the cause. By treating the cause we will thus be treating the disease. Certainly, a great many cases will not be reached or relieved by a course of mechano-therapy; in some there is a positive contra-indication to such treatment. In others, again, mechano-therapy is decidedly called for. Reibmayer believes that "for habitual constipation, especially in persons of sedentary habits, abdominal massage, combined with pelvic gymnastics, constitutes the most desirable, sure, and efficient remedy that we possess." Graham, of Boston, writes: "Atony of the muscular coat of the stomach or intestines, with deficient peristaltic action and consequent disturbances of digestion, accompanied with distention from flatulence or solid contents, is usually benefited to a marked degree by appropriate massage after ordinary exercise and other measures fail."

Finally, Auerbach says: "Disorders of the digestive apparatus, and especially constipation, constitute one of the most marked indications for the employment of massage. When there are no complications, but the symptoms are due to disordered secretions, one can always effect a cure in one or two months, or, at the outside, three or four. Massage answers admirably for

women who suffer from this condition, especially when there is a lax condition of the walls of the abdomen resulting from frequent pregnancies."

When it has been decided to employ massage and medical gymnastics in a case of chronic constipation, the making up of a suitable prescription of movements is often a very difficult task. Some authors recommend a course of general massage, including special manipulations of the colon and liver; others favor a special treatment of the following character:

a. Respiratory movements.

b. Circumduction of the thighs; reclining posture.

c. Flexion and extension of the trunk; astride-sitting posture.

d. Digital kneading of the colon; deep digital kneading of the descending part; palmar stroking of the colon; dorsal posture.

e. Kneading, and ulnar percussion over the liver, followed by upward digital pressure and vibration; dorsal posture.

f. Abduction and adduction of the thighs; dorsal posture.

g. Rotation of the trunk; astride-sitting posture.

h. Dorsal percussion on the lower region of the back; standing posture with support.

i. Respiratory movements.

Changes of this programme may be made to suit each case. The rule is to give one sitting daily. A too rapidly favorable result must not be expected.

In chronic constipation the liver is generally torpid and congested. Sometimes there is tenderness in the region of this organ. Regarding this condition Taylor says: "This condition manifests imperfect oxidation of the blood, and a consequent retention of matters

that ought to have been reduced, through respiration, to a soluble, and volatile form, and dismissed from the body. These retained matters are proximate elements of the bile which the liver is incapable of taking up in sufficient quantity. The tissues are wanting in moisture; the refuse materials of the system are not thoroughly reduced, as they should be, to carbonic acid and water. To remedy this state, such movements as improve the respiratory action are demanded, together with a curtailment of the amount of food taken. In this way the harmonious co-operation of the digestive and respiratory functions is restored."

Together with respiratory movements in the treatment of a congested liver, local massage should also be used, and among the different manipulations we are accustomed to rely principally upon ulnar percussion and kneading. According to Posse, kneading should be done in the following manner: "The liver is kneaded by the right hand grasping the waist just below the ribs, fingers in front, thumb behind, and alternately contracting and relaxing without rotary motion."

In trouble of this kind it is often required to pay special attention to the stomach. Digital kneading, ulnar percussion, and palmar stroking are to be recommended. The stomach is kneaded by the fingers of one hand, working in the epigastric region.

CHAPTER XII.

A SHORT REVIEW OF MECHANO-THERAPY IN CONNECTION WITH OBSTETRICS.

Any member of the medical profession who has had a large experience in either private or public practice will certainly recognize the importance of mechano-therapy in connection with obstetrics. In order to simplify the matter we will review medical gymnastics and massage during the three different periods: pregnancy, labor, and the puerperal state.

PREGNANCY.

1. In women of sedentary and indolent habits, and who at the same time are high livers, general massage with medical gymnastics will prove beneficial as an aid to the overworked digestive organs, and as a substitute for exercise. The treatment should be given in bed either daily, or four or five times weekly.

2. Degeneration, neurasthenia, and muscular relaxation are generally to be found both in women who are reared among the luxuries of civilization and move in "*society*," and in members of the "*demi monde*." Late hours, all kinds of excitement and dissipation have made them quite "*blasées*." A tardy and painful labor must be expected among this class. Mechano-therapy, given during pregnancy, will to some extent counteract the anomalies of the expellent forces in such cases, and should be so directed as to strengthen the abdominal

muscles and to make the ligaments of the pelvis more elastic; also as to be a sedative to the nervous system. The treatment should be given in bed, and for three quarters of an hour daily.

3. Occasionally we meet women with an excellent physique, who, during pregnancy, and without suffering from any disease, lose flesh and strength. Such a woman grows emaciated and anæmic, and after a difficult and abnormal labor gives birth to a very large child. Her pelvis may be entirely normal. In such cases, and having the experience of a previous labor to govern us, a course of mechano-therapy will often improve the situation. The object of the treatment should be to increase the action of the organs of nutrition and to carry the increased nutrition toward the mother's muscular system; that is, from within outward. By this the development of the fœtus will be retarded, and after a normal and comparatively easy labor a normal-sized child will be born.

4. In nausea and vomiting of pregnancy a course of massage and medical gymnastics will often be beneficial.

5. The digital stretching or dilatation of the os externum and cervix in cases of hyperemesis during pregnancy is only an act of massage.

6. The habit of abortion is often remedied by pelvic massage in connection with a long-extended course of general massage.

The question will now arise, How close up to labor do we dare to extend the treatment by mechano-therapy? The answer must be: The attending physician should be the judge in each case. Cases have been reported where the treatment was carried out daily up to the first stage of labor.

LABOR.

First Stage.—In this stage labor becomes pathological when the pains are defective on account of their short duration. When everything else is normal, and labor far advanced, the object of the treatment should be to make the pains longer and more expulsive in character; *i.e.*, to produce effective uterine contractions. Massage, properly executed, will often be of great service. It should be performed in the following order: friction of the fundus, pressure and vibration of the fundus, palmar stroking of the lateral sides of the uterus from above downward, all through the abdominal wall.

Second Stage.—When the rotation of the head is completed and the pains are weak and irregular, and the only resistance to be overcome is that of the soft parts, the time for the forcible expulsion is at hand. This performance is only a variety of massage.

Third Stage.—Undoubtedly the dangers of this stage are best overcome by massage. It should be performed in the following way: friction of the fundus, kneading of the fundus, and during the acme of a contraction palmar pressure of the uterus from above downward, together with some slight vibration. These procedures should be carefully executed through the abdominal coverings until the placenta is expressed, which is usually effected during the third or fourth pain.

After delivery of the placenta massage is again indicated. Now it consists of gentle friction, kneading, and pressure of fundus until contraction and retraction of the uterus are accomplished. These manipulations are to be repeated when uterus shows a tendency to relax.

THE PUERPERAL STATE.

1. In case of **phlegmasia alba dolens** mechano-therapy is exceedingly useful. The treatment should commence when the tenderness subsides and the leg begins to pit on pressure. The different manipulations should be: friction, kneading, pressure and vibration, and stroking—all centripetal in character—together with first passive and then active movements.

2. **Caked Breast and Mastitis.**—Caked breasts are promptly relieved by massage. Parenchymatous inflammation following a caked breast can also be successfully treated in this manner. Even in cases of mastitis, where pus already has been formed, it can be evacuated by skilful massage. The different manœuvres should be made in the following order: friction, digital kneading, palmar pressure and vibration, digital stroking. These manipulations should be directed from the base of the breast to the nipple. Massage is contra-indicated when there is a gradual rise of temperature, dull pain in the breast, redness and œdema of the skin, enlargement and tenderness of the axillary glands—in short all symptoms of interstitial mastitis.

3. **Subinvolution.**—Mechano-therapy plays a prominent rôle in the treatment of this abnormal condition of the uterus. It may be caused by chronic pulmonary, cardiac, or hepatic diseases, by chronic constipation, by rising too soon after parturition, by displacements of the uterus, by retained secundines, by a lacerated cervix or perineum, or by any uterine or pelvic inflammatory process. The accepted rule is: first, to treat the cause, if possible, and then to employ mechano-therapy in order to relieve the congestion.

4. The excessive enlargement of the breasts and great

relaxation of the abdominal muscles so often noticed after labor may be treated with advantage by massage and medical gymnastics.

5. During this period mechano-therapy has often been successfully employed to correct displacements of the uterus.

6. A symptomatic, if not an anatomical, cure will be effected by this treatment in cases of movable kidneys, which during labor have become further displaced, and produce distressing symptoms.

Medical gymnastics and general massage can without danger begin two weeks after labor. Pelvic or direct uterine massage should not be given before the seventh week.

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CHAPTER XIII.

MECHANO-THERAPY AS AN AGENT IN THE TREATMENT OF DISEASES OF CHILDREN.

Suspended Animation, or Asphyxia Neonatorum. A. *Sylvester's Method, or Passive Abduction and Adduction of the Arms together with Lateral Pressure on the Chest.*

1. The infant is placed in the lying posture with a pillow under its shoulders in order to prevent the chin from falling forward. The mouth is opened, and the tongue is drawn forward. The operator, standing to the right of the little patient, facing him, grasps his arms a little above the elbows, abducts and everts them. During this movement the act of inspiration is accomplished.

2. The operator now adducts the child's arms, after which he makes slight pressure with his hands on the sides of the patient's chest. Expiration is accomplished by this movement.

These procedures should be repeated a few times at regular intervals, imitating the acts of normal respiration. This method can be used without danger in feeble infants.

B. *Schultze's Method, or Passive Respiratory Movements.*

1. The operator, occupying the standing posture with separated feet and a flexed trunk, grasps the infant with his thumbs over the anterior surface of the shoulders, and the index-fingers in the axillary spaces, while the

remaining fingers support the upper part of the child's back. The posterior surface of the child's body is directed toward the operator, with the legs hanging downward, and the head backward, somewhat supported by the operator's wrists. By this movement inspiration is obtained.

2. Now, the infant is swung upward until the operator's arms are about midway between flexion and abduction. The operator at the same time extending his trunk. This manœuvre produces expiration. These movements can be repeated about eight times, at intervals of a few seconds, not oftener than twenty times a minute.

Of all the movements used for this purpose those executed according to Schultze's method are the strongest.

Constipation, Colic, and Fecal Obstruction.

1. The mother or nurse, occupying the sitting posture, places the infant on her knees in the dorsal posture, with its head toward her and its lower extremities toward the operator, who sits in front. The operator gently performs digital kneading of the abdomen, followed by passive circumduction, flexion, and extension of the hip-joints.

2. The child is now placed on the mother's knee in the lying posture with the face downward, and a slight dorsal percussion of the lower part of the back is done.

3. The child is placed in the astride-sitting posture across the mother's knee, supported by her, and circumduction of the trunk is executed by the operator.

4. At last, the operator performs vibration and stroking of the child's abdomen; the child occupying the same posture as in No. 1.

Of course, these movements must be executed very gently and with the greatest care. The results obtained

in the majority of cases have been very favorable. In chronic constipation a regular course extended over a period of two or three weeks, with daily sittings, must be carried out.

Malnutrition or Marasmus.

General massage, given in a careful manner, will often prove beneficial. It is highly recommended to use cod-liver oil as an unguent in the different manipulations in such cases.

Infantile Spinal Paralysis, or Acute Anterior Polio-Myelitis.—As we know this is usually a disease of the first three years of life. After the febrile symptoms have subsided, and the acute stage is passed, an early and persistent application of mechano-therapy in the form of general massage will often arrest the atrophy and degeneration of the muscles, and restore them to their normal condition and power. If there are any exaggerated manifestations of the disease in any of the extremities, special attention, in the form of local massage and medical gymnastics, must be paid to that part of the body.

Prolapsus Ani.—For the treatment of this disease the following prescription is used by Thure Brandt, of Stockholm, Sweden:

1. Dorsal percussion of the lower part of the back; standing posture with support.

2. Upward pressure and vibration of the lower part of rectum through the anus; knee-chest posture.

3. Upward digital pressure and vibration of the *sigmoid flexure;* dorsal posture.

This movement is executed in the following manner: the operator places himself on the right side of and facing the patient. His left hand is placed on the patient's right shoulder as a support, and with his right

hand placed in the left iliac fossa, he tries to work his way through the relaxed abdominal wall and grasp the sigmoid flexure. Now, with the finger-tips directed upward, he makes slight pressure with vibration. This manipulation is repeated from five to six times.

4. Abduction and adduction of the thighs; dorsal posture.

Nocturnal Incontinence of Urine.

If this condition is dependent upon an abnormal condition of the nervous system, found in delicate children, a cure may be accomplished by the use of mechano-therapy in connection with other remedial agents.

General massage, together with a special treatment of the following nature, may be tried:

1. Slight dorsal percussion on the lower part of the back; standing posture with support.

2. Pressure and vibration on the hypogastric region just above the pubic arch; dorsal posture.

3. Abduction and adduction of the thighs; dorsal posture.

4. Pressure and vibration on the perineum; dorsal posture.

Rickets.—An extended daily course of general massage, faithfully carried out, will always improve this trouble, and in a comparatively short time effect a cure. Cod-liver oil may be used as an unguent in the manipulations.

Flat-foot.—General massage together with local manipulations constitute a treatment which has proved most successful. The latter part consists principally of friction, kneading, percussion, pressure and vibration, and stroking of the muscles and ligaments of the plantar surface of the foot and the posterior part of the leg,

together with circumduction, flexion, extension, abduction and adduction of the foot and toes.

Scoliosis or Lateral Curvature of the Spine.—Since the establishment of the Royal Gymnastic Central Institute in Stockholm, this abnormal condition has been treated by mechano-therapy. The causes of this disease are to be found in a general muscular weakness and lack of development, in connection with lack of strength of the different ligaments of the spinal column. To this must be added a faulty position by habit, loss of muscular control or co-ordination, and an inherited or acquired strumous or rachitic diathesis. With the etiology before us, a treatment which will improve the general health, strengthen and develop the muscles and ligaments, gradually train the body to occupy a correct position, and educate the muscles to a normal co-ordination, must undoubtedly be the most rational one, especially if by its employment the best results are obtained, Nature assisted in overcoming this deformity, and a permanent cure effected. If the muscles on the convex side of the curve are weak and degenerated, it is easy to understand that our effort must be to strengthen and develop them. If the convexity is toward the left side, it must be our endeavor to restore that side to its normal condition by an isolated activity of the muscles and ligaments on that side of the spinal column, effected by massage and medical gymnastics, such as abduction and adduction toward the left with a support given at the highest point of the convexity. If in such a case the right shoulder should occupy a lower position than the left, active abduction and adduction against resistance should be practised with the right arm. Too rapid a result must not be expected. As a rule the course must be extended over a period of three months, with daily

sittings. General massage will improve the general health.

Chorea.—In this disease the beneficial effects of general massage and medical gymnastics, accurately and scientifically executed, must be emphasized.

CHAPTER XIV.

A FEW REMARKS CONCERNING THE USE OF MECHANO-THERAPY IN CONNECTION WITH DISEASES OF THE NERVOUS SYSTEM.

1. **Massage.**—Regarding the different manipulations of massage we know that percussion, stretching, pressure, vibration, and stroking, are chiefly employed in the treatment of the different diseases of the nerves. Posse has laid down the following general rules: "To lessen neural activity, give pressure or prolonged percussion; to increase it, give brief percussion or vibration. For motor disturbances work from periphery to center; for sensory disturbances from center to periphery."

Further, the same author says: "Pressure is entirely local in its effect, percussion somewhat more extended, and vibration is quite general."

Stretching is also a very valuable variety of massage in the treatment of nervous disorders, especially whenever the nerve is large and superficial, or easily reached, as the great sciatic or the anterior crural. Brandt highly recommends stroking, slowly and gently executed, as having the action of a sedative, and often of a soporific. Stroking used for this purpose should always be done from the center, that is from the brain to the periphery.

To sum up, the uses of the different manipulations of

massage in connection with nervous disorders would be :

Friction.—Irritation of the cutaneous nerves.

Kneading.—To lessen sensory irritability.

Percussion.—Neural tonic.

Stretching.—Strong sedative in neuralgic pain.

Pressure.—Mild sedative in neuralgic pain.

Vibration.—Stimulant in different kinds of paralysis.

Stroking.—General sedative and hypnotic.

2. **Medical Gymnastics.**—Regarding the utility of medical gymnastics in connection with different kinds of cramps, convulsions, tremors, loss of muscular power, and loss of co-ordination, all symptoms of cerebral or spinal lesions, we may adopt the following rules :

a. They will increase the muscular power in the affected extremities.

b. They will improve co-ordination by bringing the muscular contraction and relaxation under control of the will.

c. By the scientific use of first passive and then of active medical gymnastics the patient will regain confidence in his power of motion and locomotion, and his physical and mental condition will slowly but gradually improve.

d. Great patience and skill, and the full confidence of the patient, are three things absolutely necessary for the success of such treatment.

3. **General Observations.**—Circumduction of the head will relieve cerebral hyperæmia ; it is contra-indicated in cerebral anæmia, hemiplegia, and paraplegia. In cases of insomnia caused by mental overwork, anxiety, alcohol, or mania, a course of mechano-therapy is indicated, and circumduction of the head should always

be used in prescriptions for such cases. This movement is also a hypnotic.

Brandt recommends intermittent pressure on the jugular veins, with the patient's head in hyper-extension, to be used in similar cases.

Friction, percussion, and pressure along the spine will relieve spinal congestion by increasing the cutaneous circulation. Passive and active movements of the lower extremities will also aid the flow of blood from the head. Therefore they should be used in the treatment of insomnia or cerebral or spinal hyperæmia.

In the treatment of hysteria, hypochondriasis, or neurasthenia, special attention should always be paid to the organs of digestion.

In neuritis we must commence slowly and by degrees increase the strength and time of each séance.

Norström claims to have observed that sciatica, be it either of the neuralgic or of the neuritic form, is always accompanied by more or less inflammation of the muscles in the neighborhood of the nerve, and the treatment consists of massage not only of the nerve, but also of the surrounding muscles. It will, perhaps, also be of some interest to mention that a similar inflammation of the muscles of the neck often occurs. The patient complains of constant headache, dizziness, and vertigo, which symptoms are greatly increased while occupied in brain-work. Local massage is to be recommended in such cases.

Even in the treatment of localized spasm and paralysis, as writer's cramp, the best result is obtained by combining general massage with local treatment.

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CHAPTER XV.

LOCAL TREATMENT.

This method of treatment is employed to relieve and cure local injuries and diseases, or local manifestations of general diseases.

I. **Fractures.**—Although many prominent surgeons have advocated mechano-therapy in the treatment of fractures, the medical profession, both in Europe and America, has rightly hesitated in approving and adopting it. Undoubtedly, it gives a wide field for careful investigations and experiments. Alexander C. Wiener, of Chicago, has reported several cases successfully treated in this way. An especially skilful operator may, perhaps, now and then reach a favorable result, but until we have received more reports and statistics it must be included in the class of *experimental surgery.* In the after-treatment of fractures, again, after union has occurred, mechano-therapy should always be employed. It will prevent atrophy of the muscles, stiffness, false ankylosis, and deformity of the nearest joints. It will lessen the time of convalescence. Its usefulness in such cases has been recognized by the oldest nations, such as the Chinese, Egyptians, Greeks, and Romans.

Massage, consisting of centripetal manipulations, can be commenced on the third or fourth week after the accident, gradually adding passive and active medical gymnastics of the nearest joints.

II. **Dislocations.**—What has been said above with respect to fractures is also true regarding different dislocations.

III. **Sprains.**—In various sprains of the foot mechano-therapy is the classic treatment. A simple sprain of the foot treated by this method will render the foot useful after seven days. The treatment should begin immediately after the accident, and be repeated daily. The time of each sitting should not exceed twenty minutes. The foot is first carefully cleansed with warm water and green soap, and then vaseline or any other fatty substance is applied. The operator, after carefully washing his hands, places the patient in the lying or reclining posture, and while sitting in front of the patient he supports the injured limb on his knee. Gentle massage, consisting of digital friction, kneading, and stroking, all of a centripetal character, constitutes the first treatment. Now, gently rub off the grease with alcohol of 95 per cent. strength, and apply a firm bandage. It has been recommended to soak the foot in hot water, 105° F., for about half an hour immediately before the massage. The first treatment is always quite painful, but after two or three séances it becomes painless. At the fifth sitting some passive medical gymnastics of the foot may be practised, and at the sixth or seventh some active movements.

IV. **Sciatica.**—Gustaf Norström, of New York, reports one hundred and fifty cases of sciatica treated by mechano-therapy with very few failures. The same author claims to have observed, and we fully agree with him, that sciatica, be it either of the neuralgic or of the neuritic form, is always more or less accompanied by myositis of the muscles in the neighborhood of the nerve, generally of the gluteus medius, and of some in

the calf of the leg, as the peroneal muscles. The treatment consists of massage—friction, kneading, percussion, stretching, pressure, vibration, and stroking—not only of the nerve, but also of the surrounding muscles. The rule is to begin slowly and advance slowly. Use some vaseline, and rub the leg with alcohol after the massage. Apply a posterior splint, and let the patient rest in bed. Gradually add medical gymnastics. Of course, in such cases where the sciatica is caused by mechanical pressure this treatment is contra-indicated.

V. **Synovitis.**—Whenever we have a serous, not a purulent, synovitis, mechano-therapy should be tried. Begin with massage, consisting of centripetal manipulations, and gradually increase the length and strength of each sitting. Give a séance every day. After each treatment apply a firm bandage or a posterior splint, and let the patient rest in bed.

VI. **Hernia.**—The treatment of a strangulated hernia by *taxis* is only an act of mechano-therapy. Taxis is a Greek word signifying the acts of gentle pressure with the hands by which a rupture is reduced.

The bladder is emptied, and the patient is anæsthetized and placed in the dorsal position with the head and shoulders low, and the pelvis elevated. Flex the thighs and legs, and adduct the lower extremities, so that every muscle and ligament of the abdomen will be relaxed. The operator, standing by that side of the patient where the hernia is situated, facing the patient, defines and supports the neck of the sac with the thumb and index-finger of his left hand. The palmar surface of his right hand is placed upon the fundus of the hernia, and, gently compressing the tumor, he attempts to squeeze out any flatus and venous blood. During this time, with the thumb and fingers of the same hand, he

tries to draw the sac down, and, finally, by gentle kneading, pressure and vibration, an effort is made to dislodge part of the neck and push the gut in a direction corresponding to its line of descent. When this manipulation is properly performed the bowel slips from the fingers with a gurgling sound, and the reduction is accomplished. As long as the hernia is not painful the taxis can be continued from ten to twenty minutes. The operator should be on the look out for *reduction en masse* and *rupture of the intestine*, which are accidents greatly to be feared, and sometimes occurring in the employment of taxis.

1. **Contra-indications.**—When the gut is damaged or gangrenous.

2. When the strangulated gut was previously irreducible.

3. When the symptoms of strangulation have existed for a comparatively long time.

After the reduction a firm compress and bandage should be applied, and the patient should rest in bed for several days.

VII. **Paraphimosis.**—Robert W. Taylor, of New York, recommends the following method of reducing a paraphimosis, which procedure is only a variety of massage: "Take the penis behind the constriction between the index and middle fingers of both hands, and making very firm traction while the thumbs crowd down upon it, knead and press the dorsum and base of the glans backward." The blood is hereby masséed from the glans and the congestion relieved.

VIII. **Chronic Seminal Vesiculitis.**—E. Fuller, of New York, highly recommends the use of mechanotherapy in the treatment of this disease. After the bladder is well filled the patient is placed in the stand-

ing posture with separated feet, and with his trunk flexed at right angles to his lower extremities. The operator, standing behind the patient, with his left hand supporting and making counter-pressure on the patient's abdomen, introduces the index-finger of his right hand, well lubricated with clean vaseline, into the rectum until he reaches the seminal vesicles. By digital kneading, pressure, and stroking of the organ from above downward an effort is made to express the contents through the ejaculatory duct into the prostatic urethra.

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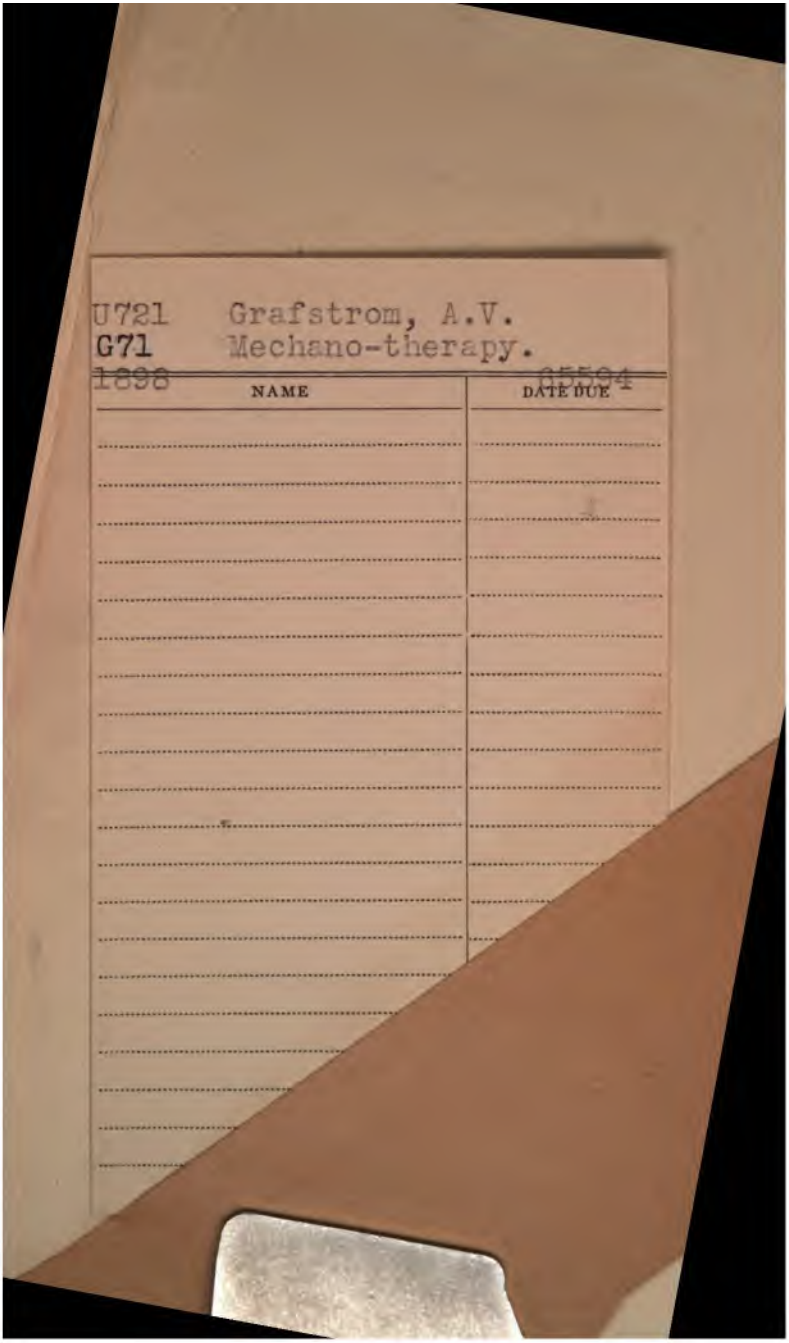
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